



Rapid Ecoregional Assessment

**Assessment Management
Team Meeting # 5 –
Preliminary Assessment
Results
Day 1**



Introductions & Updates (BLM)



AMT Workshop V: Outline (General)

Monday September 26, 2011

| | |
|-------------|---|
| 8:00-8:35a | Welcome, Introductions, and Overview |
| 8:35-8:45a | Update on the WGA Southwest Decision Support System (C. Bailey) |
| 8:45-12p | Answering “where are they” questions & scenarios |
| 12:00-1:00p | Lunch break, on your own |
| 1:00-5:00p | Assessing current ecological integrity |

Tuesday September 27, 2011

| | |
|--------------|--|
| 8:00-8:30a | Reconvene, Overview of the day’s agenda |
| 8:30p-10:00a | 2025 land use scenario |
| 10:15-12:00p | Climate Space Trends analysis (how is climate changing?) |
| 12:00p | Lunch (on your own) |
| 1:00-2:15p | Climate change effects (how are CEs changing?) |
| 2:30-4:00p | Final report outline/product formats (Ford) |
| 4:00-5:00 | Discussion, recap parking lot items, & identify new agenda items |

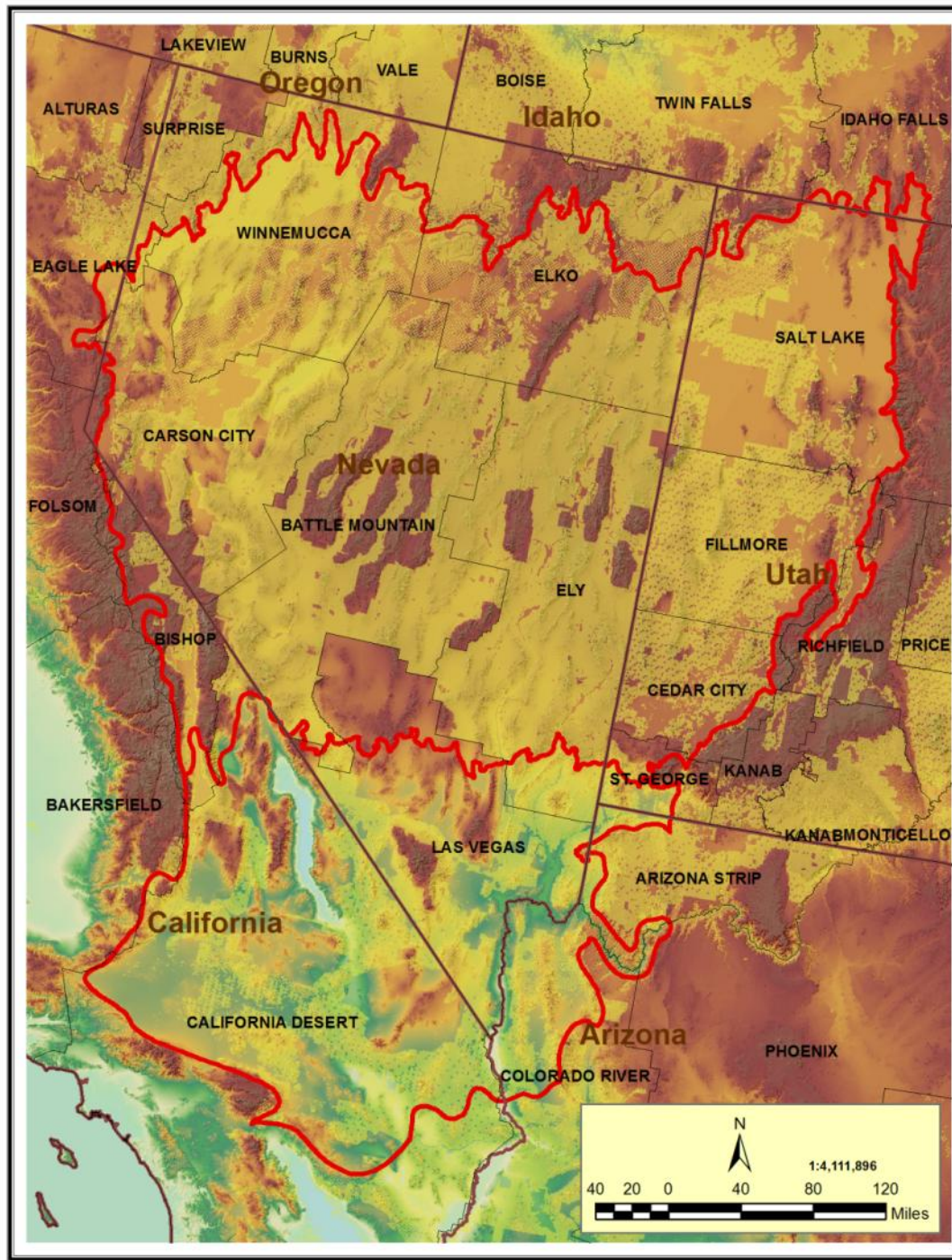
Wednesday September 28, 2011

| | |
|-----------|---|
| 1:00p | CBR specific—sage CEs focus; other remaining issues |
| 3:00p | Wrap-up |
| 4:00 p.m. | Adjourn |

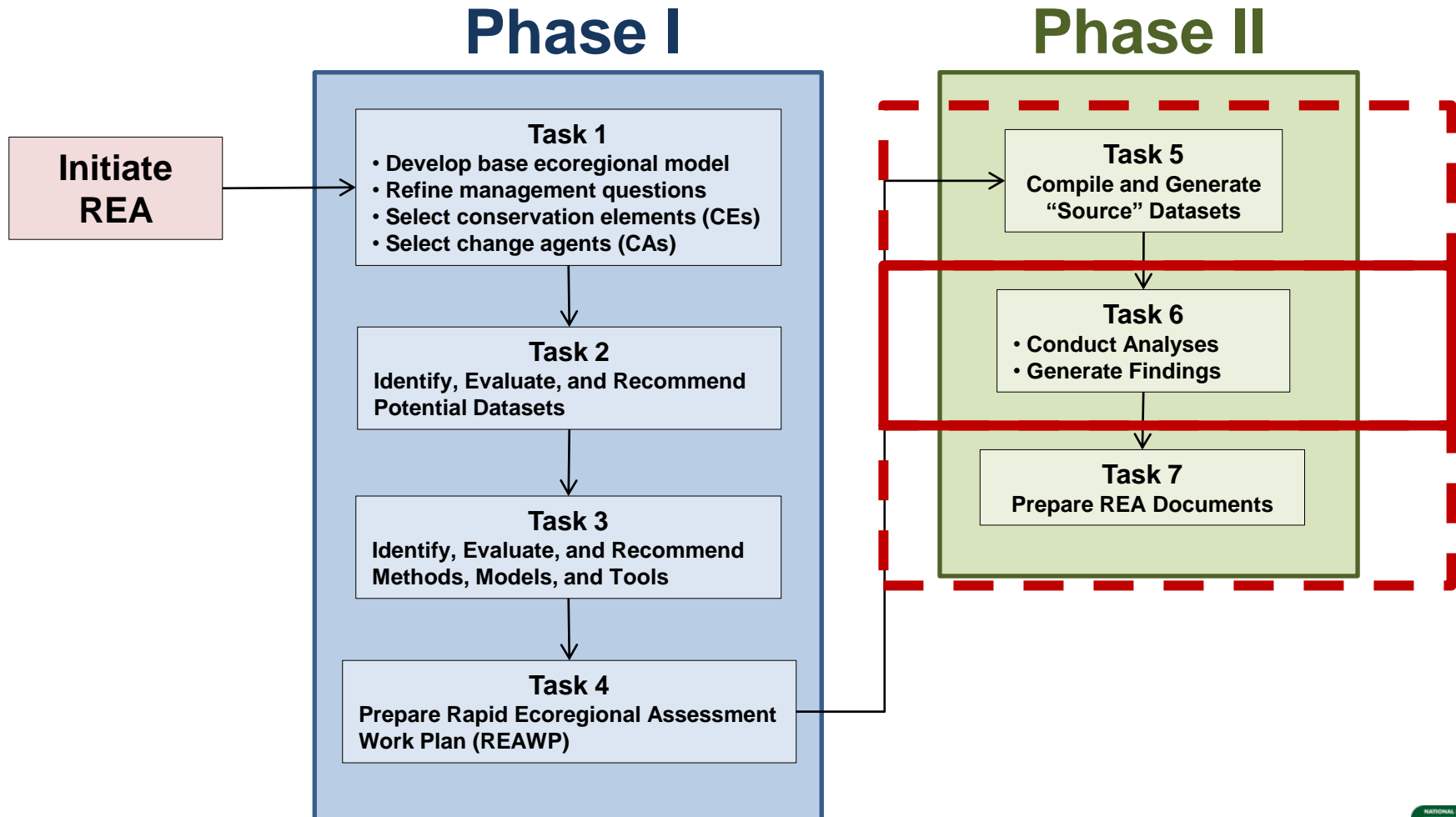


CBR & MBR REAs

Much data compilation, generation, and assessment for common MQs will be done across both regions



REA Workflow



Overview of Phase II Objectives

- Task 5: Finish compilation and generation of assessment inputs: CE distributions, CA distributions, reporting units, ancillary inputs to models
- Task 6: Conduct the assessment by running models that answer the MQs, generate maps and tabular results
- Task 7: write the REA report and compile all final deliverables

Timelines

Central

Mojave

Phase I

July 2010 - May 2011

Task 1

2-Sep-2010

2-Sep-2010

Task 2

22-Nov-2010

6-Dec-2010

Task 3

5-Mar-2011

4-Mar-2011

Task 4

21-May-2011

25-May-2011

Phase II

May 2011 - February 2012

Task 5

30-Aug-2011

30-Aug-2011

Task 6

14-Nov-2011

16-Dec-2011

Task 7

22-Mar-2012

2-Apr-2012

Note ~ 6 week extension on timeline due to late RE data receipt



Phase II AMT Involvement

- Topical web meetings (e.g., CE distributions, recreation prototype review) **conducted**
- AMT 5 (Task 6) 2-3 day intensive review of data generation and assessment results
- AMT 6 (Task 7) review of REA report and web meeting to discuss key issues

Update on the WGA Southwest Decision Support System (C. Bailey)



Answering “where are they” MQs: preliminary findings and reporting options

**AMT input: settle on final reporting units, initial
input on how CE occurrence reported by unit**



Distributions of Conservation Elements - Where are they?

- **CEs included here: xsection of terr./aq coarse filter, sensitive soils, spp assemblage, landscape species, local species**
- **Places – ACECs**
- **Assessment – ‘Gap Analysis’**



Distributions of Conservation Elements - Where are they?

CEs included here:

terr./aq coarse filter

sensitive soils

species assemblage

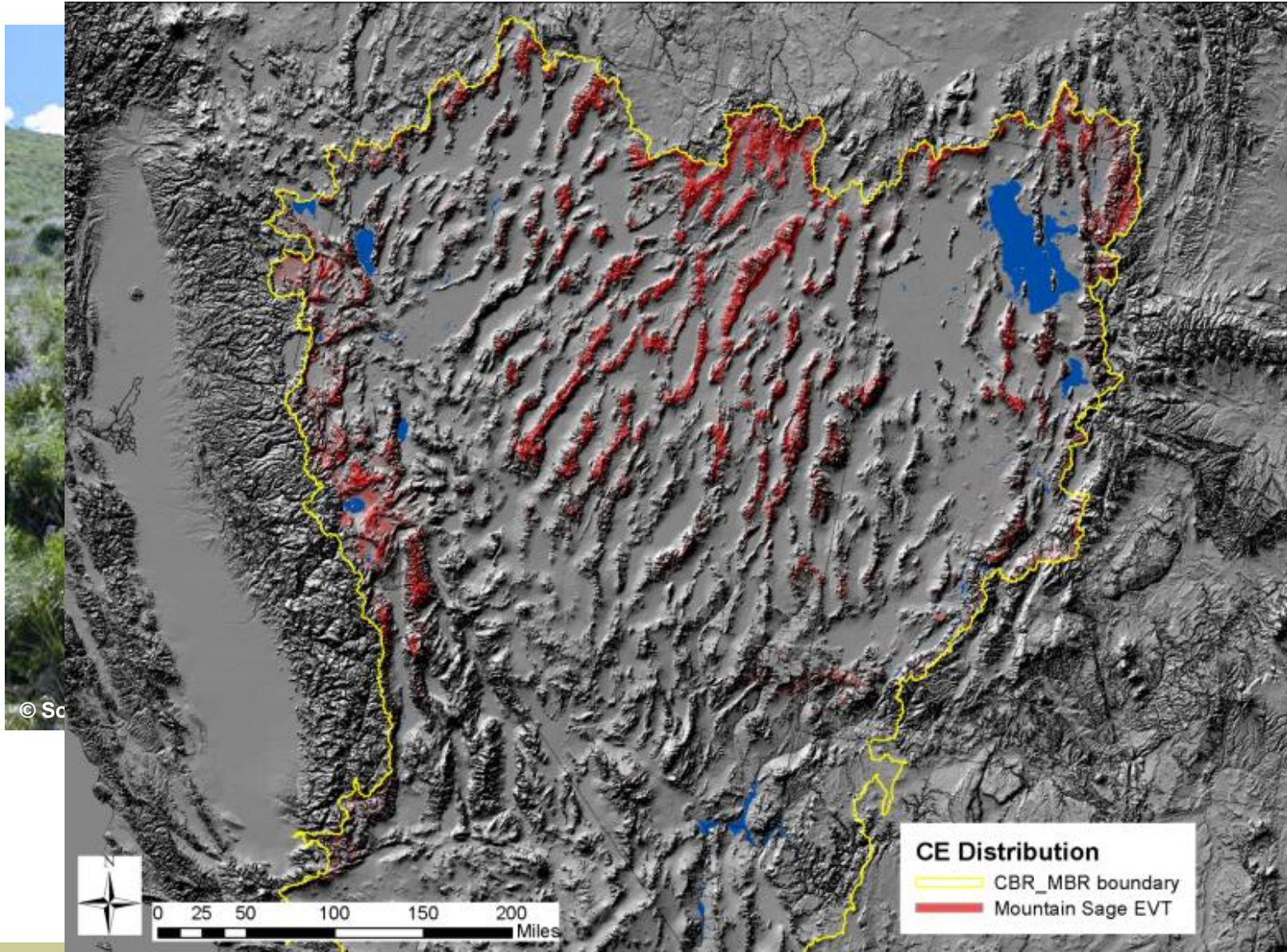
landscape species

local species



Inter-Mountain Basins

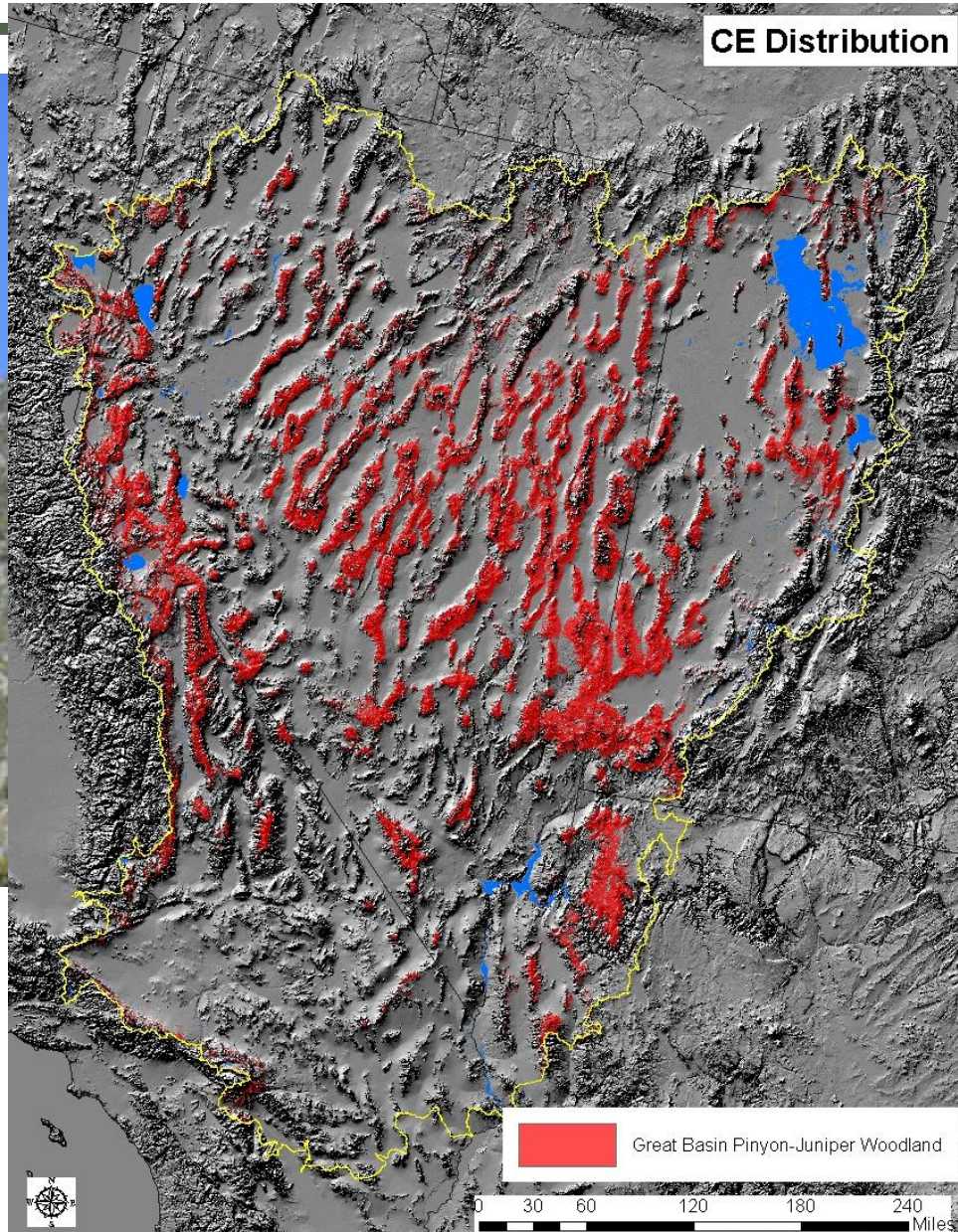
Montane Sagebrush Steppe



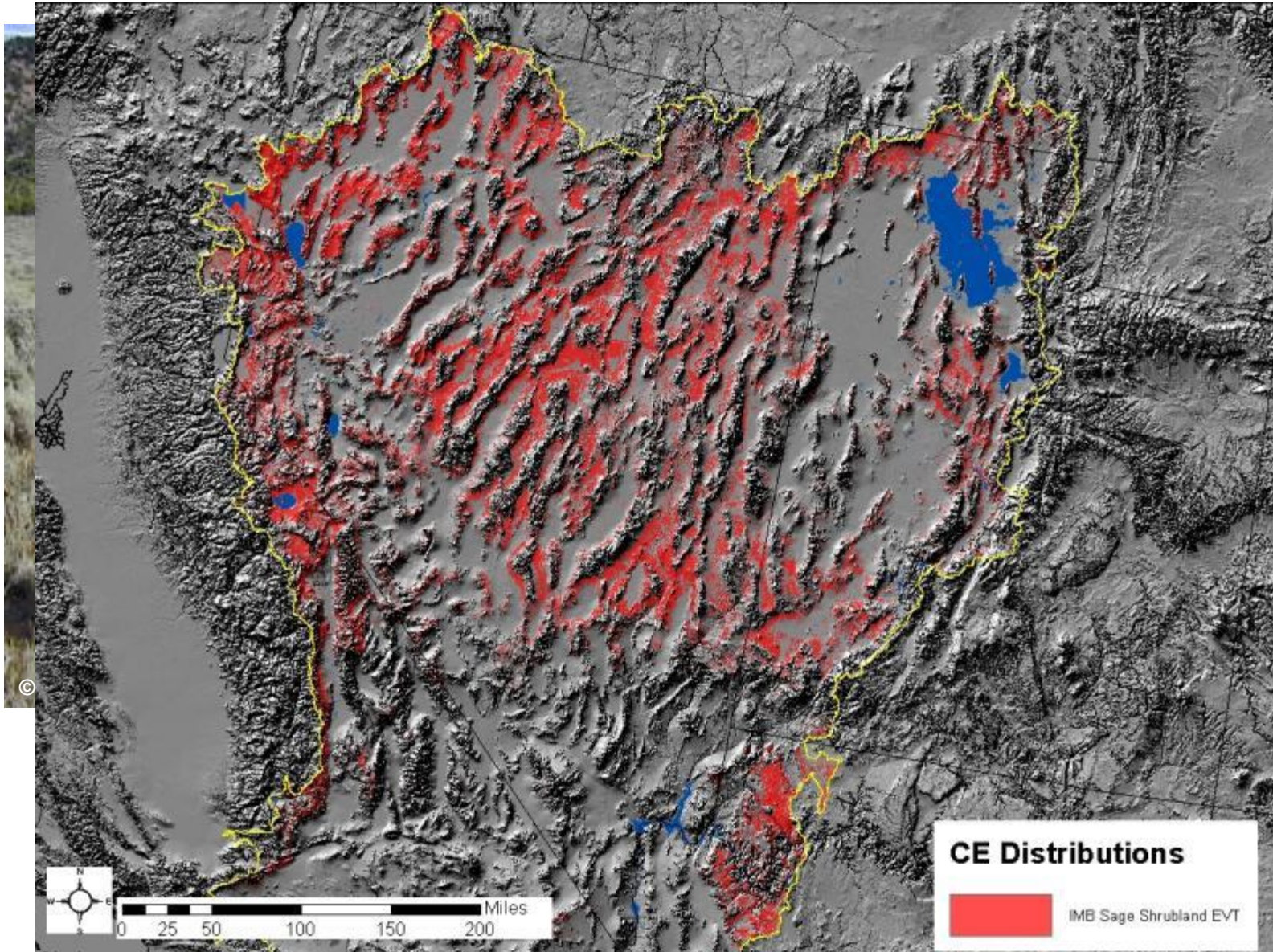
Great Basin Pinyon-Juniper Woodland



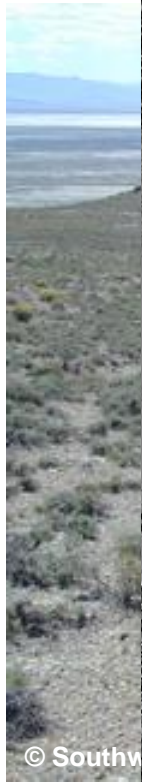
© Southwest ReGAP



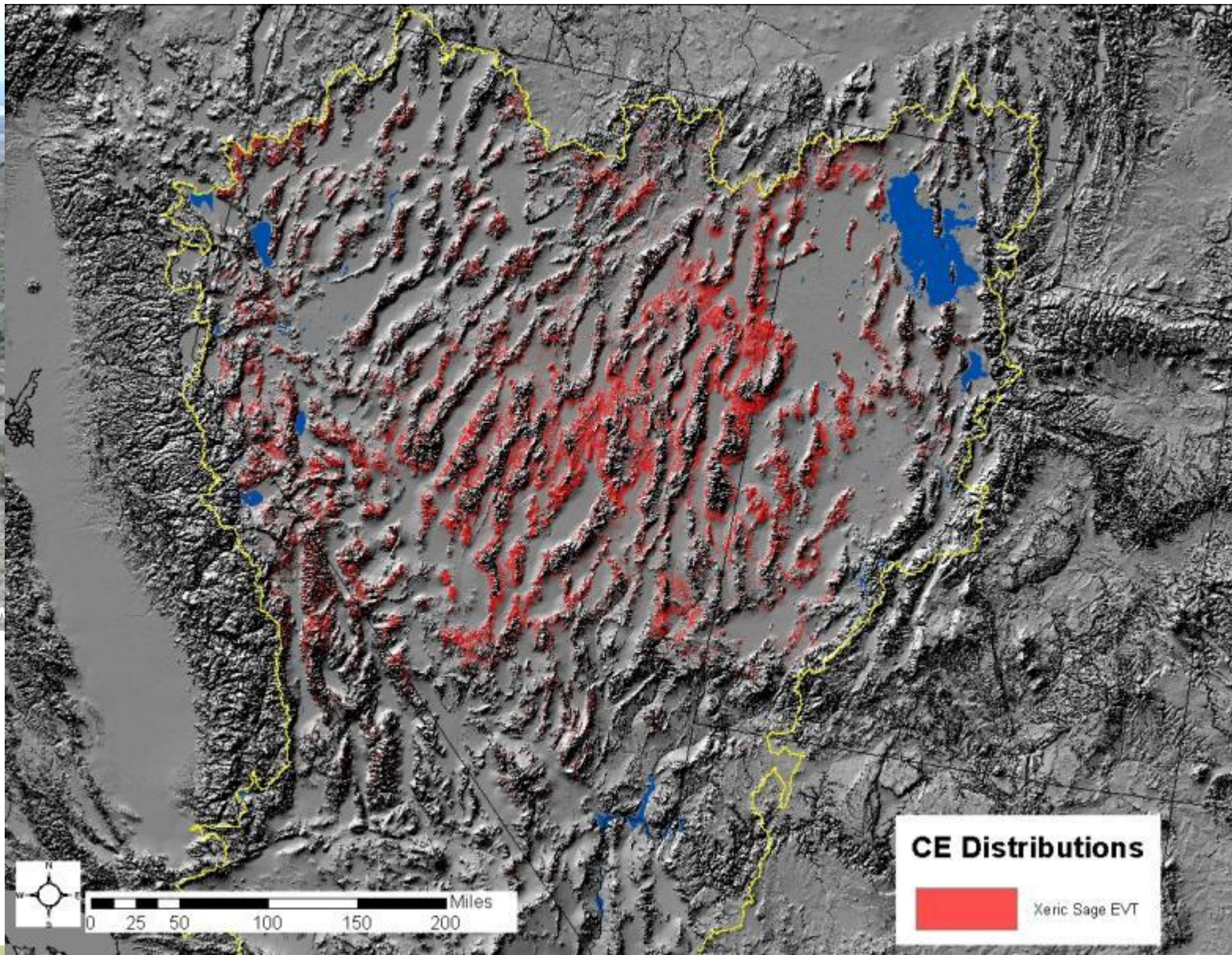
Inter-Mountain Basins Big Sagebrush Shrubland



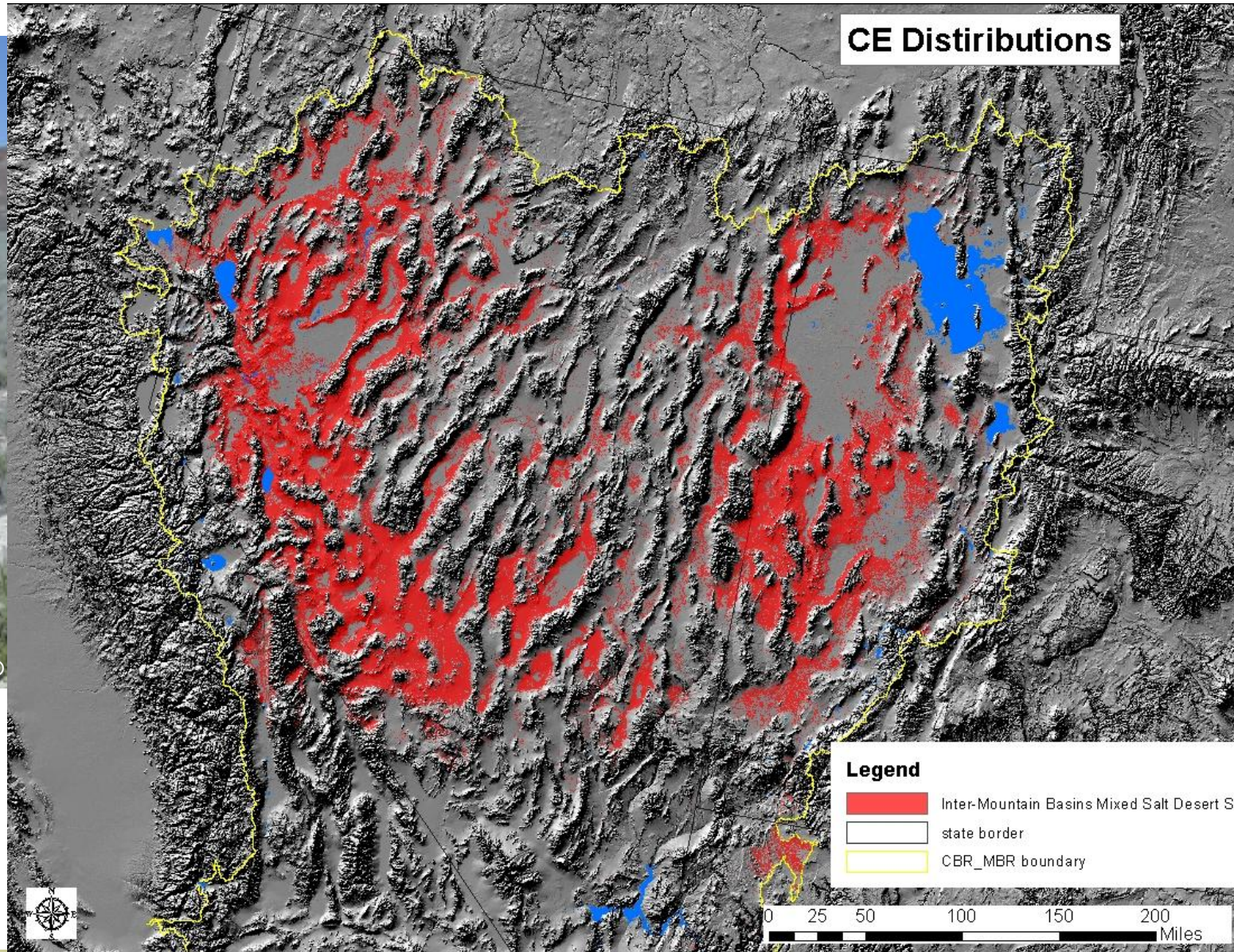
Great Basin Xeric Sagebrush Shrubland



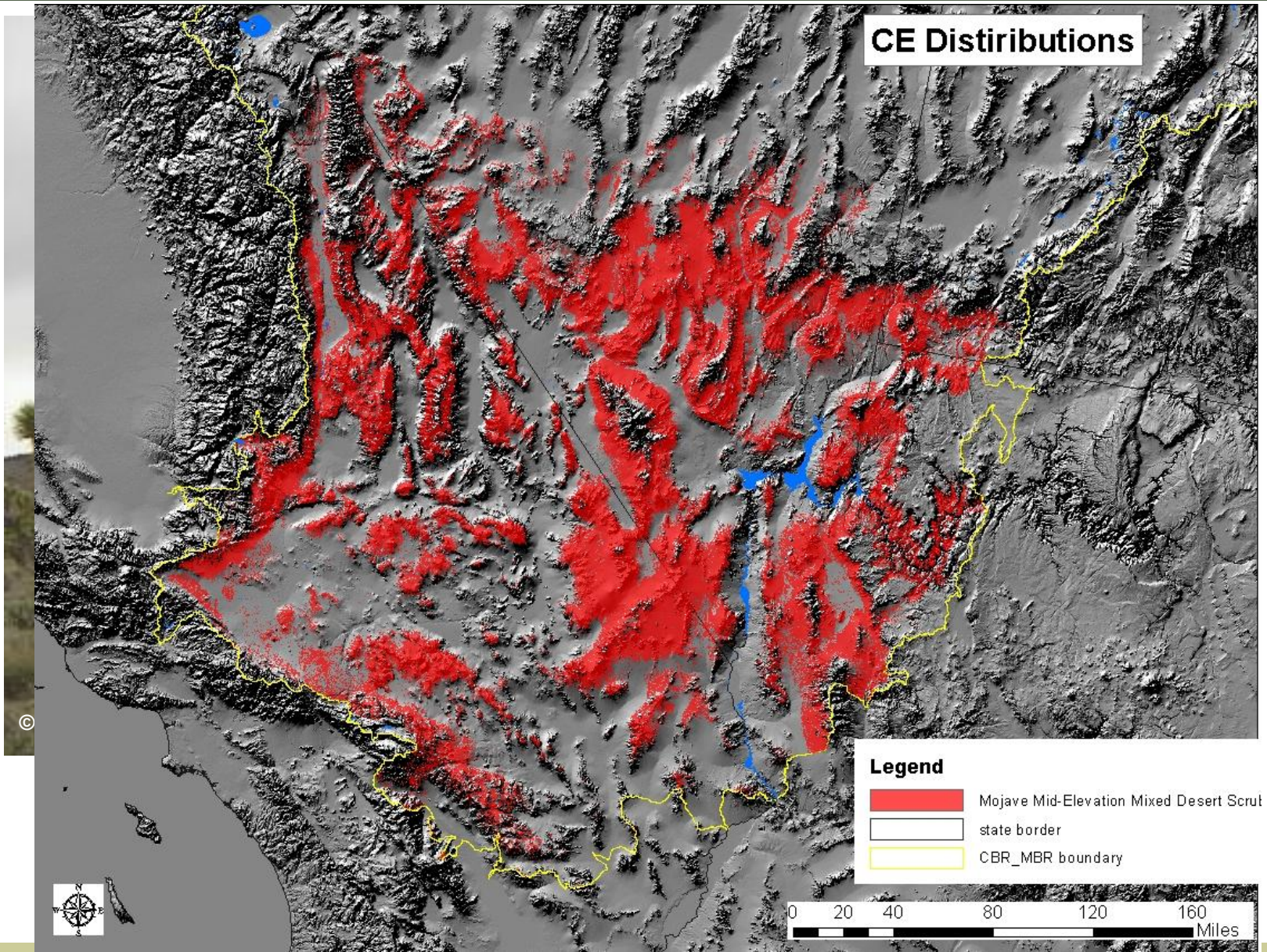
© Southw



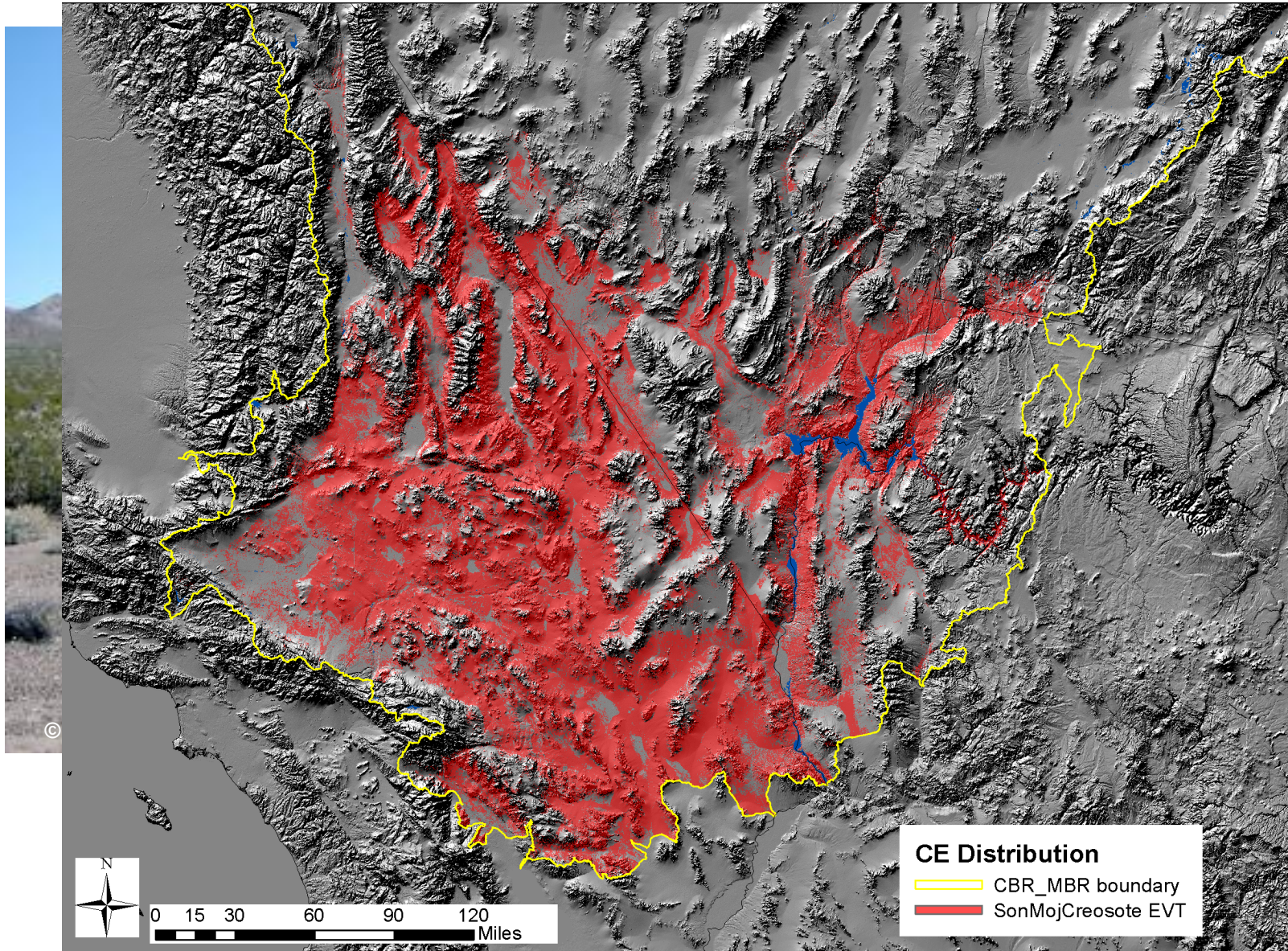
Inter-Mountain Basins Mixed Salt Desert Scrub



Mojave Mid-Elevation Desert Scrub

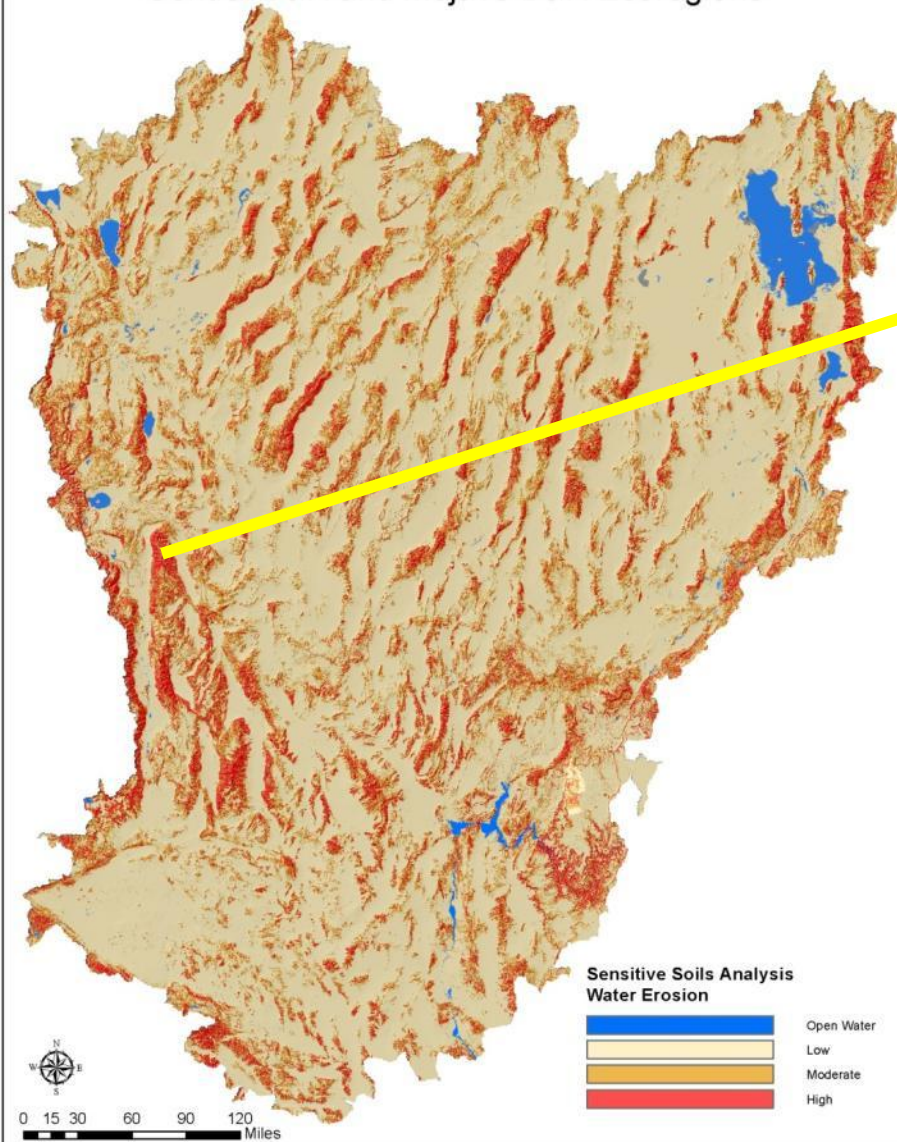


Sonora-Mojave Creosote-White Bursage Desert Scrub

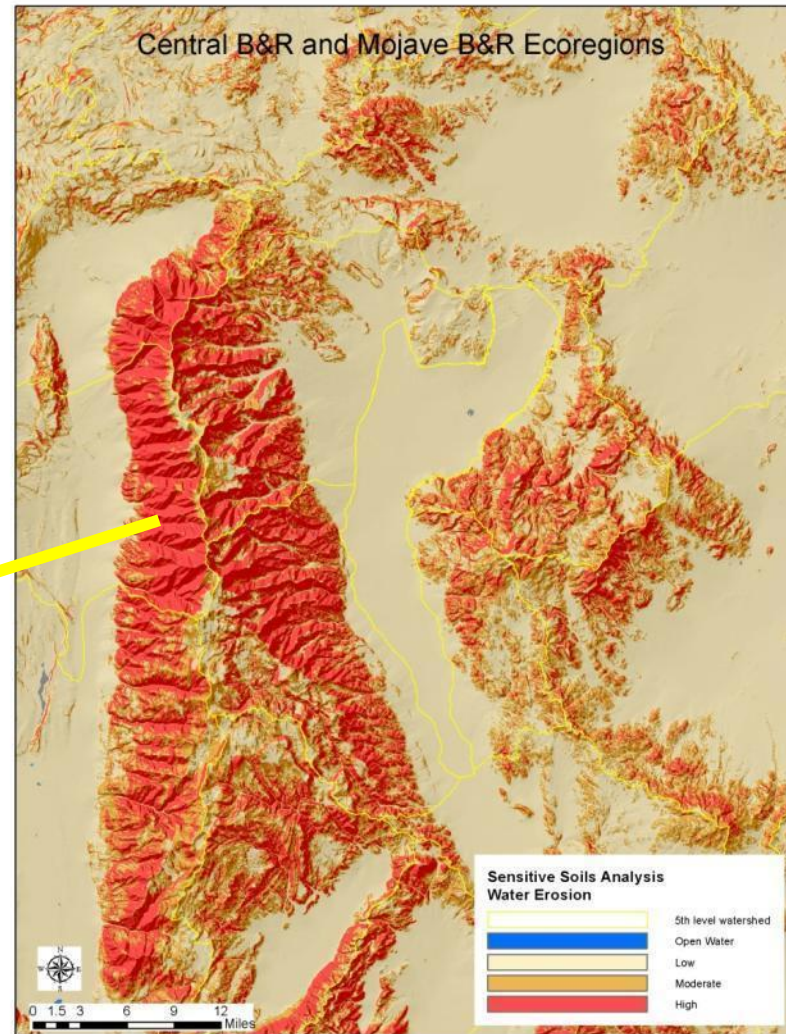


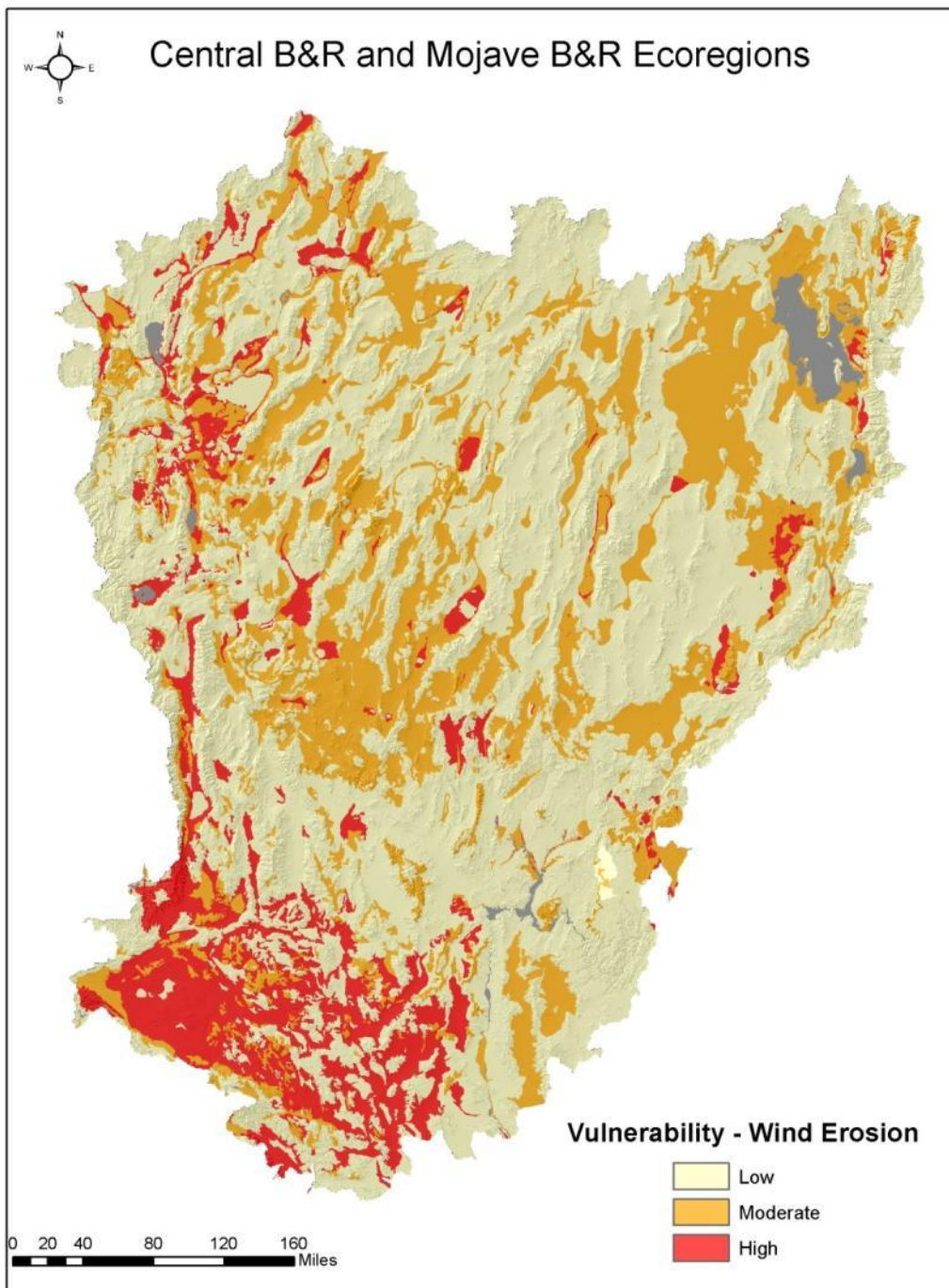
Water Erosion

Central B&R and Mojave B&R Ecoregions

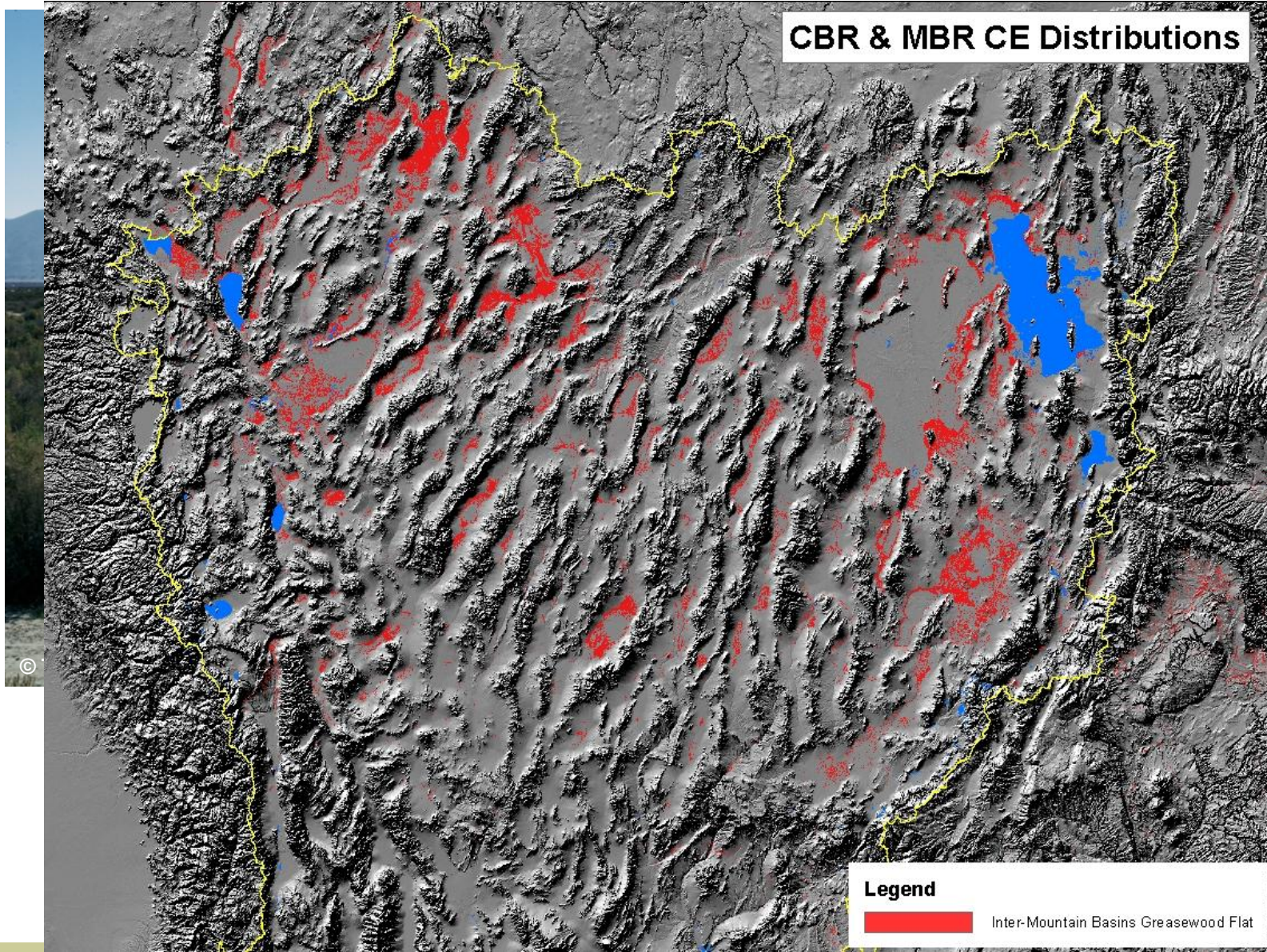


Central B&R and Mojave B&R Ecoregions

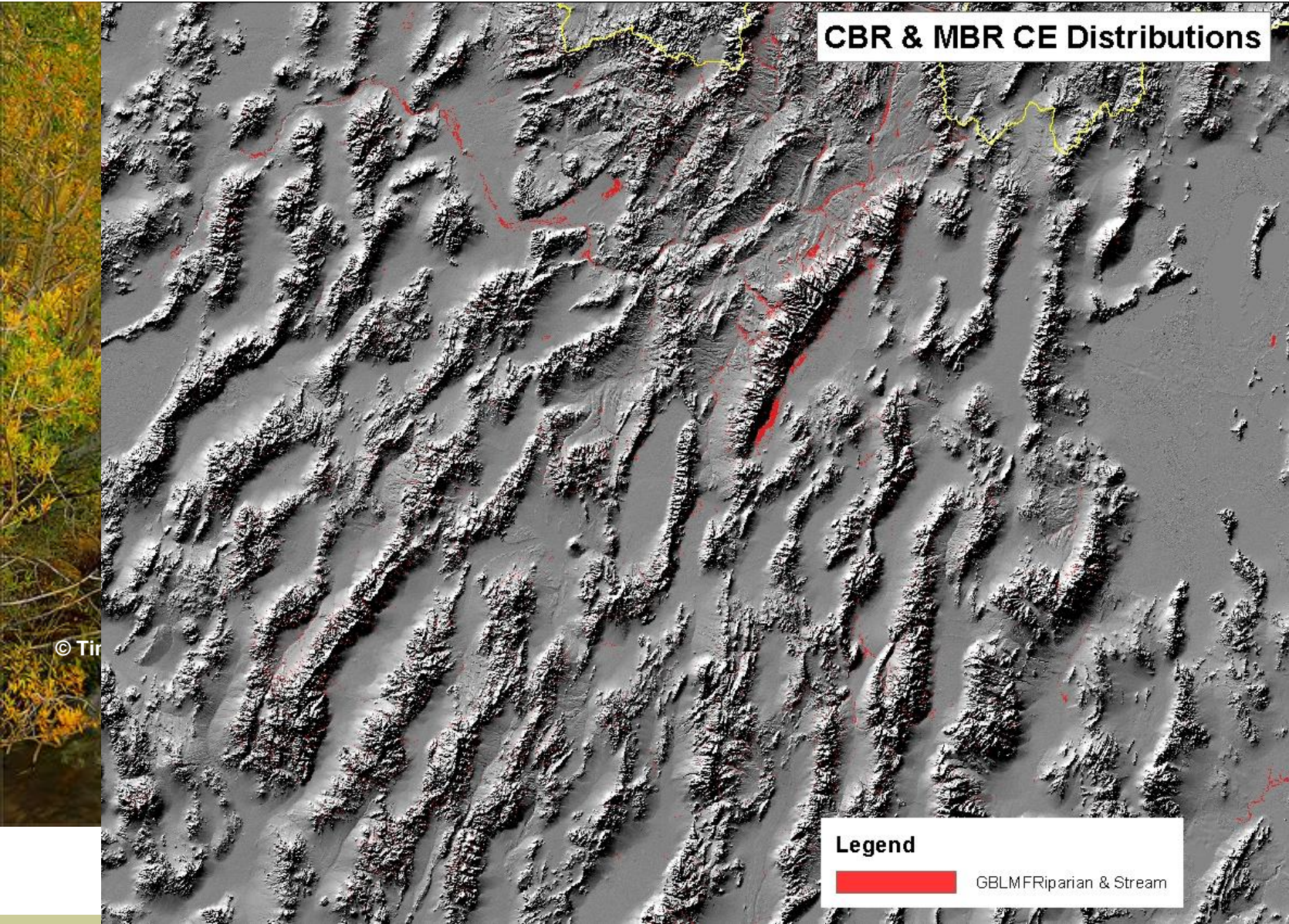




Inter-Mountain Basins Greasewood Flat

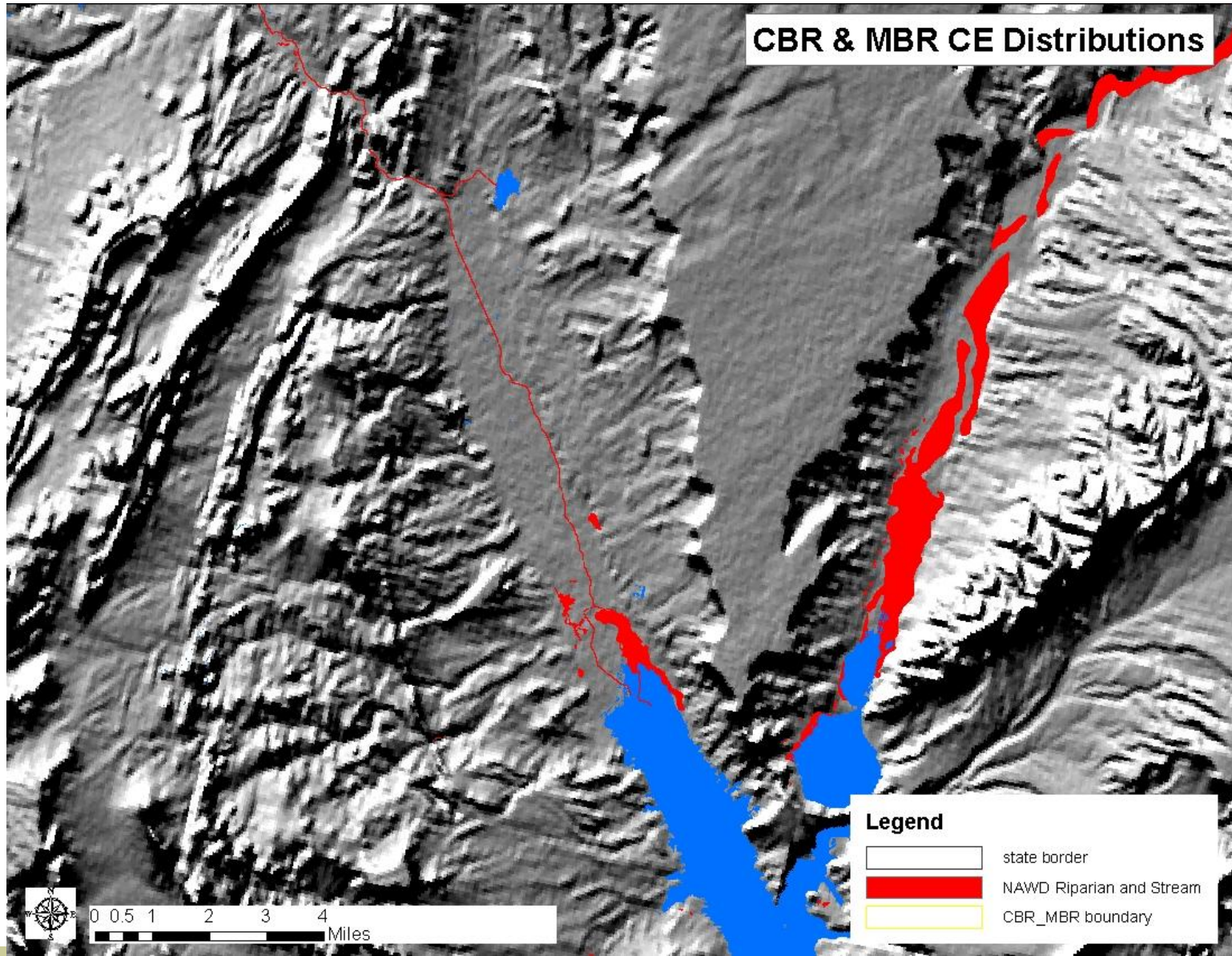


Great Basin Lower Montane Riparian and Stream

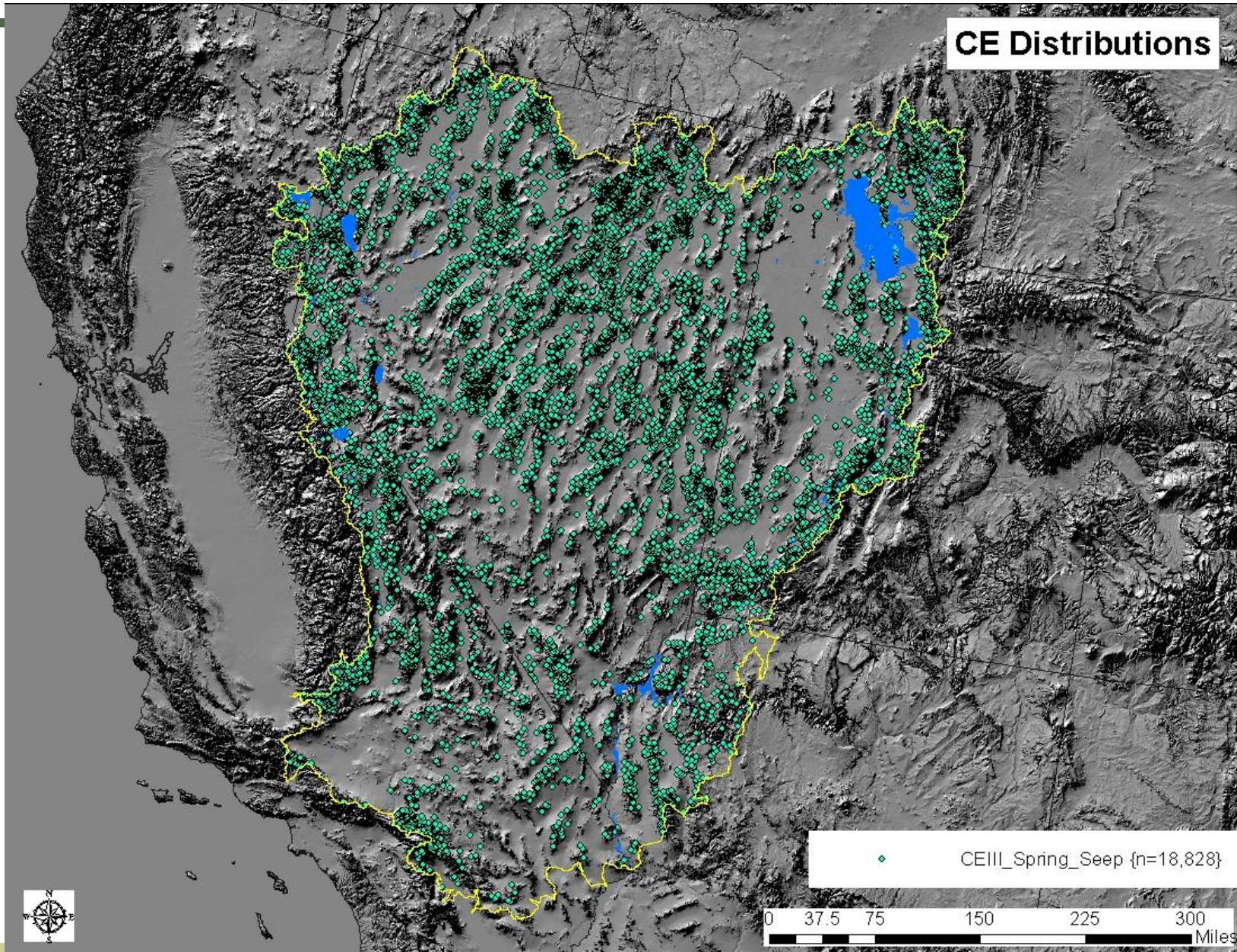


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North American Warm Desert Riparian and Stream



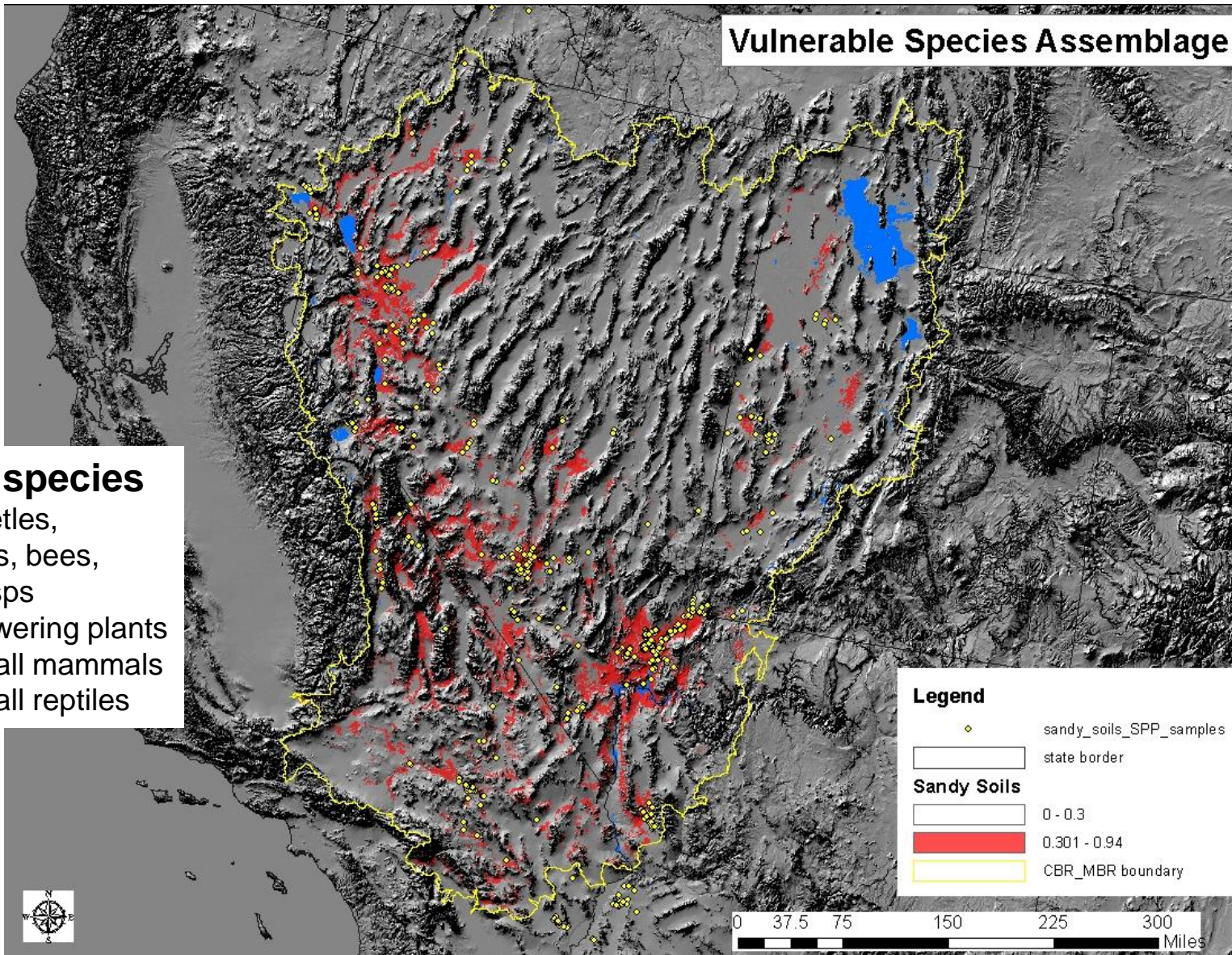
Springs and Seeps



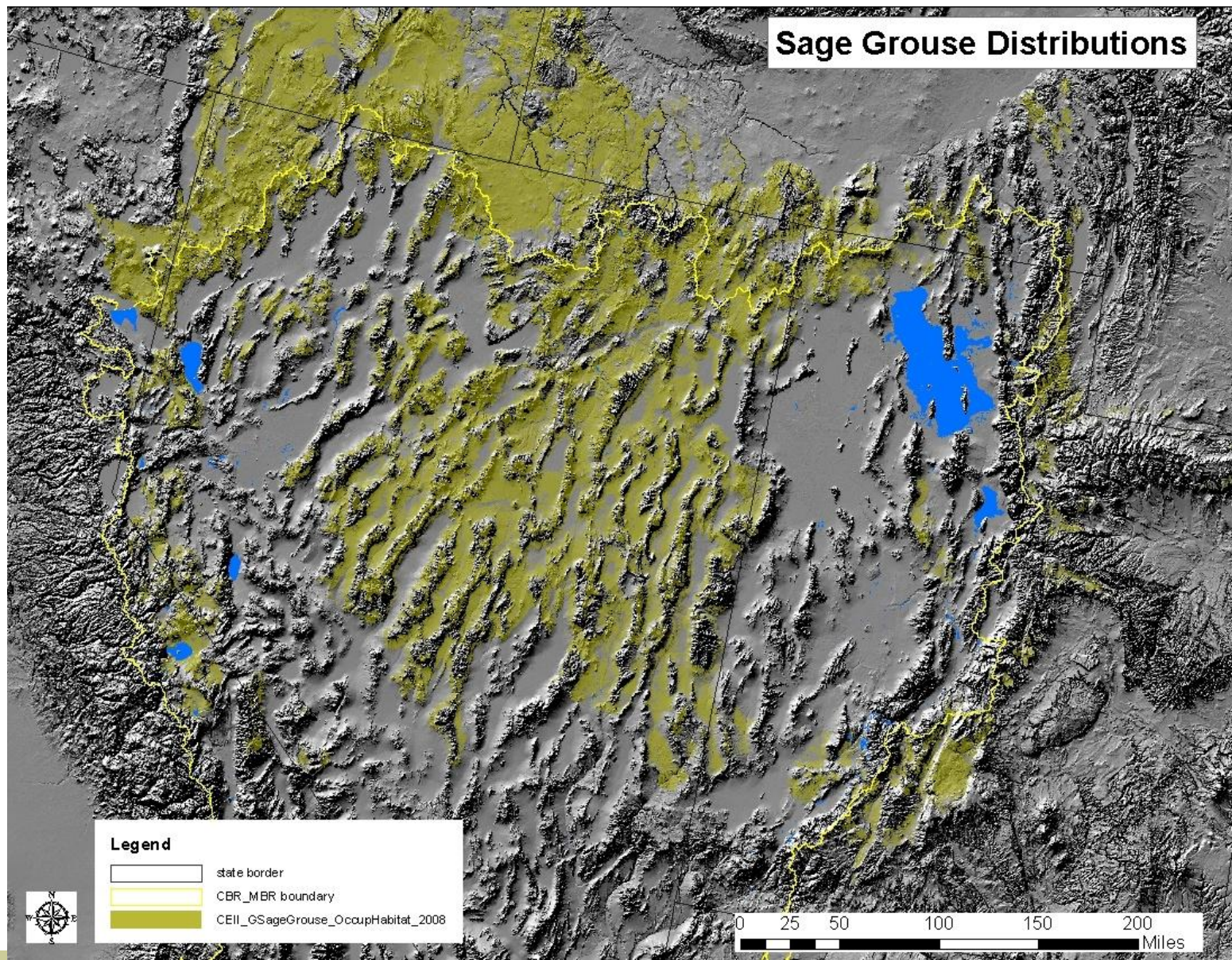
Sandy Soils- Species Assemblage

30 species

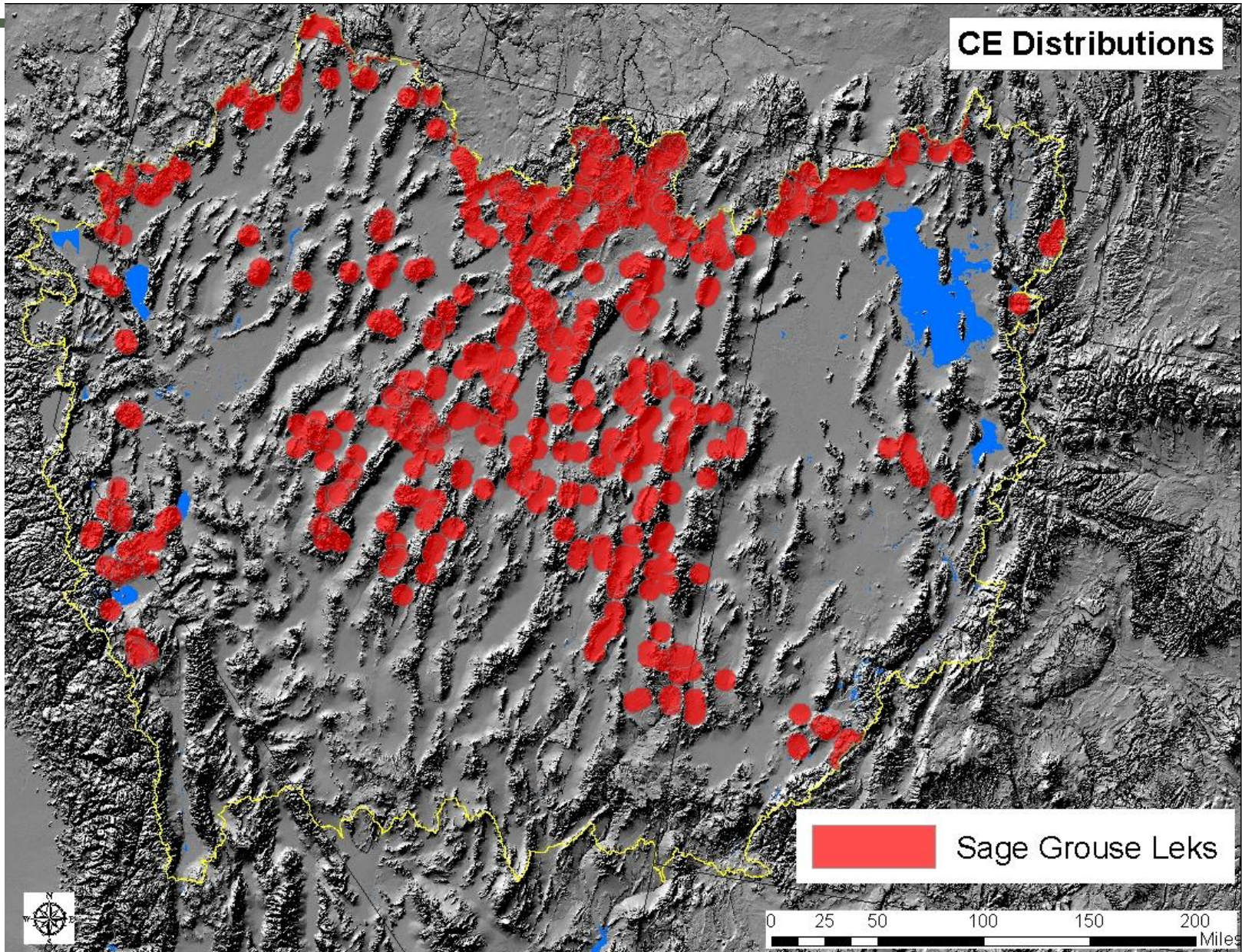
Beetles,
Ants, bees,
wasps
Flowering plants
Small mammals
Small reptiles



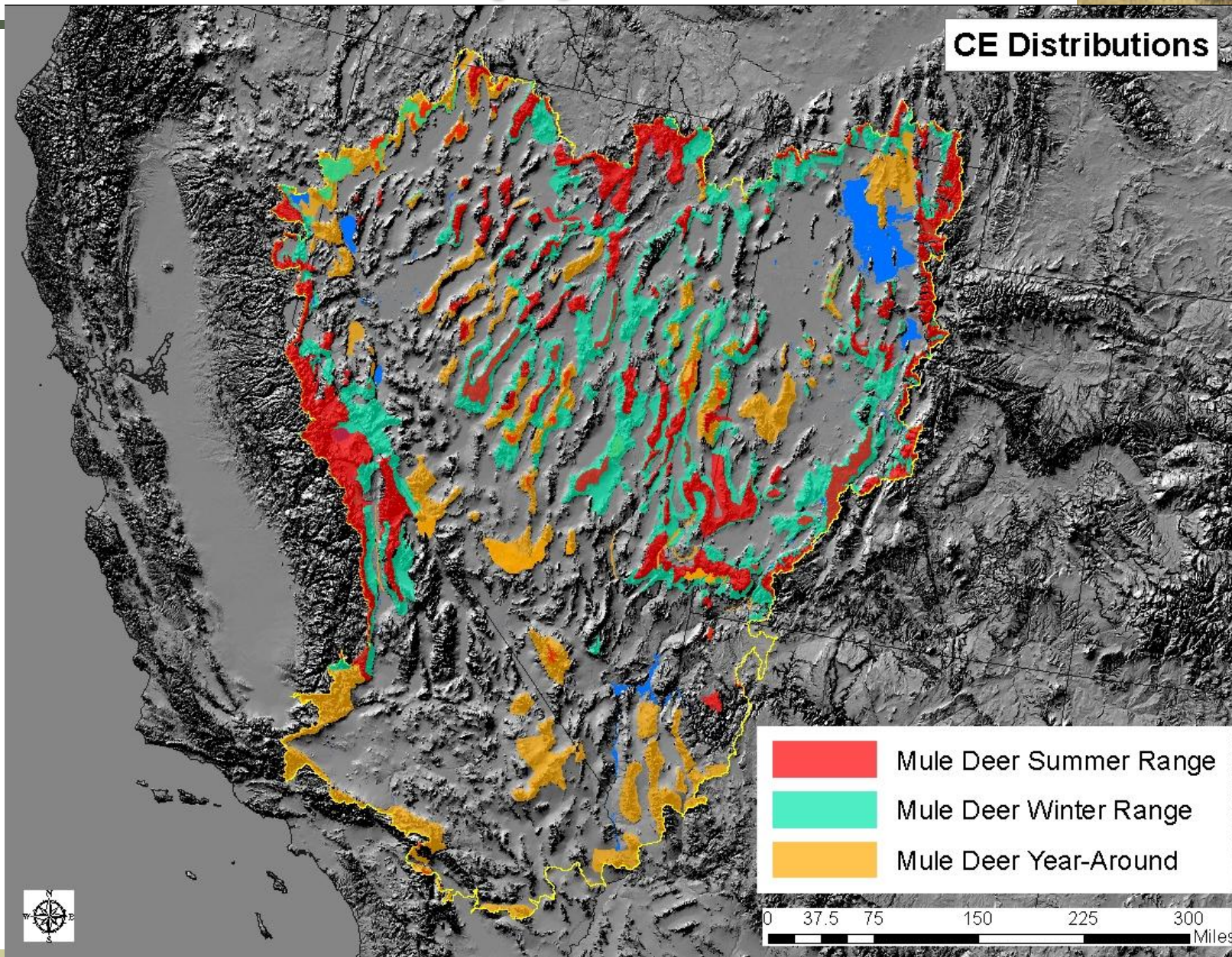
Greater Sage Grouse (2)



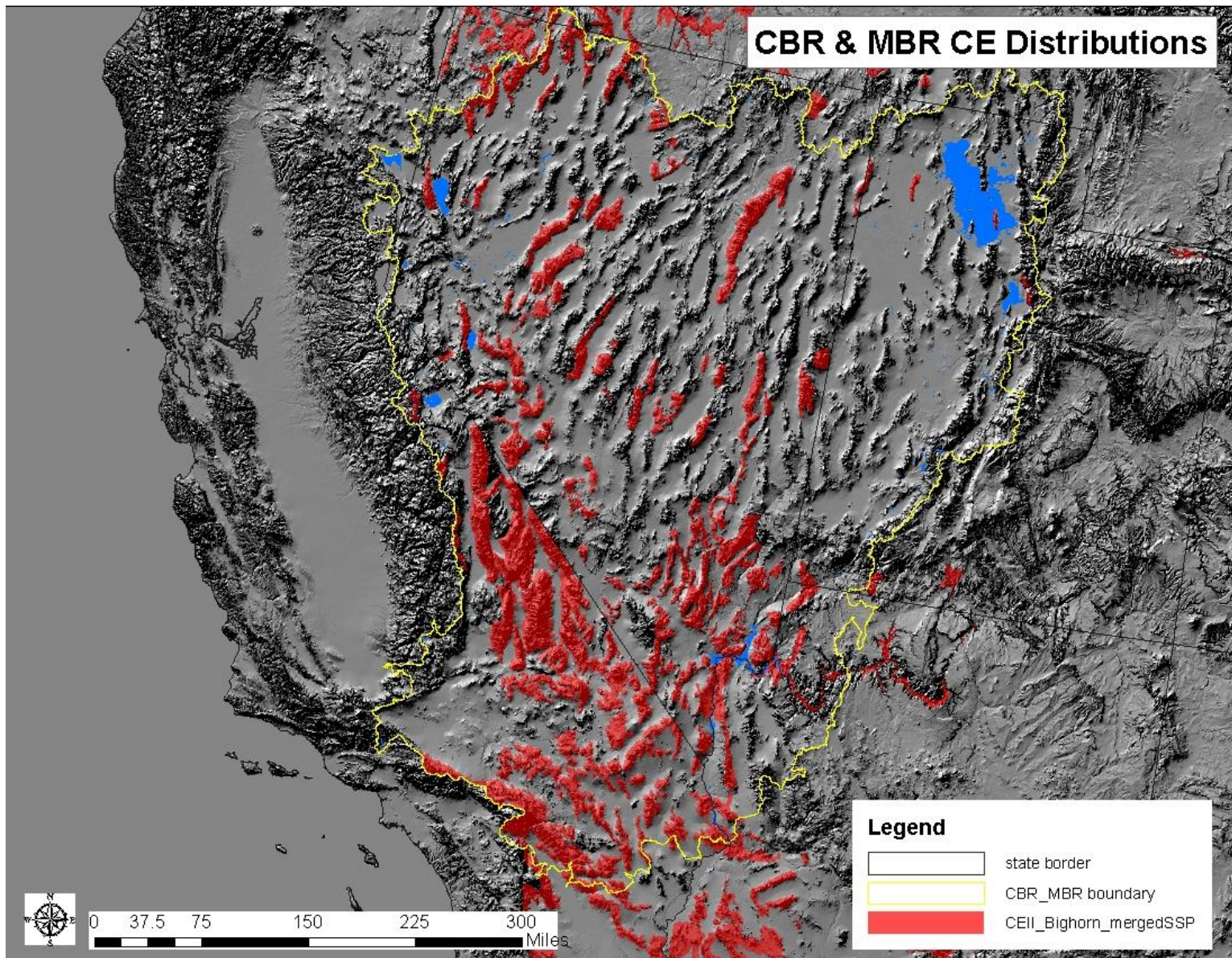
Sage Grouse Leks



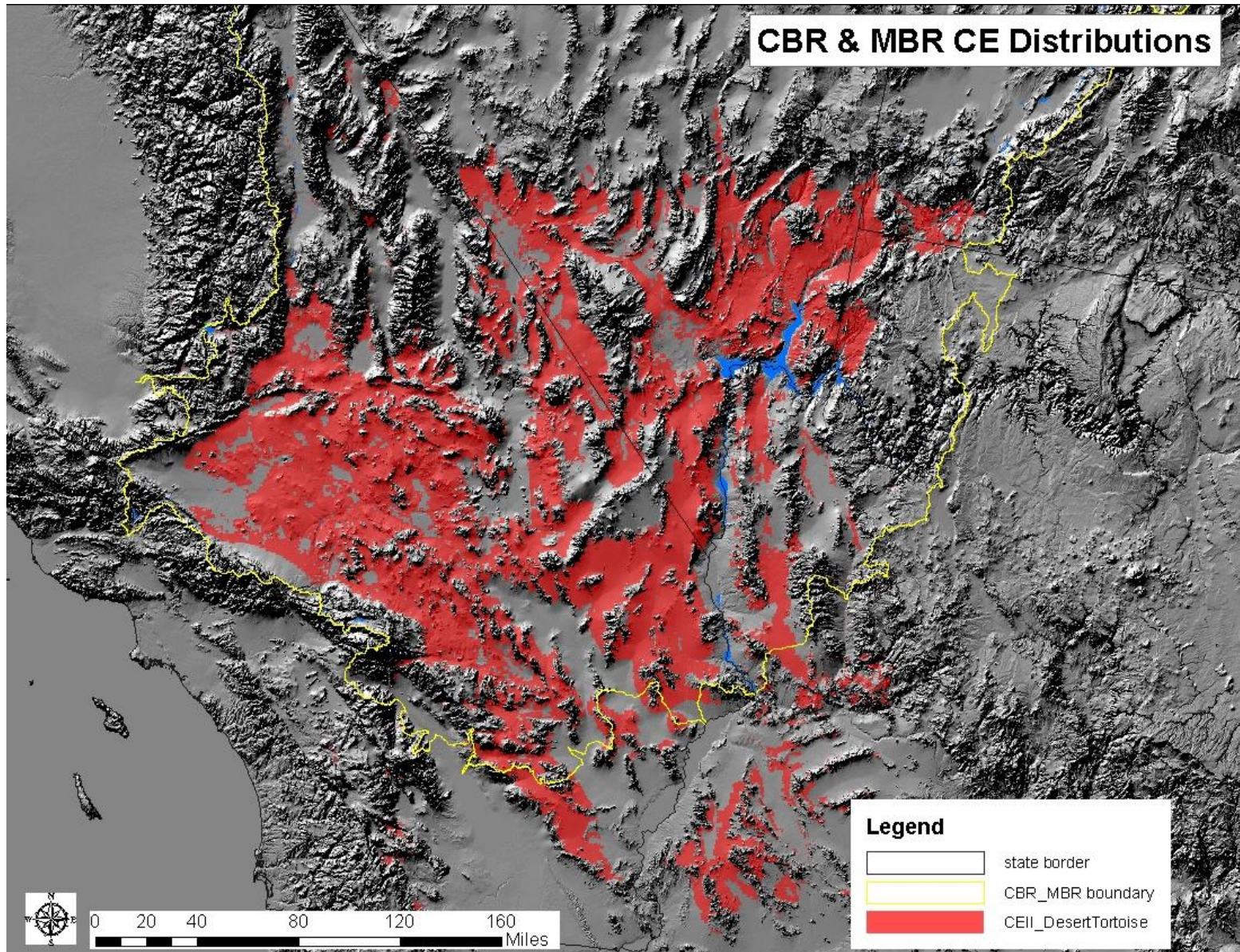
Mule Deer (3)



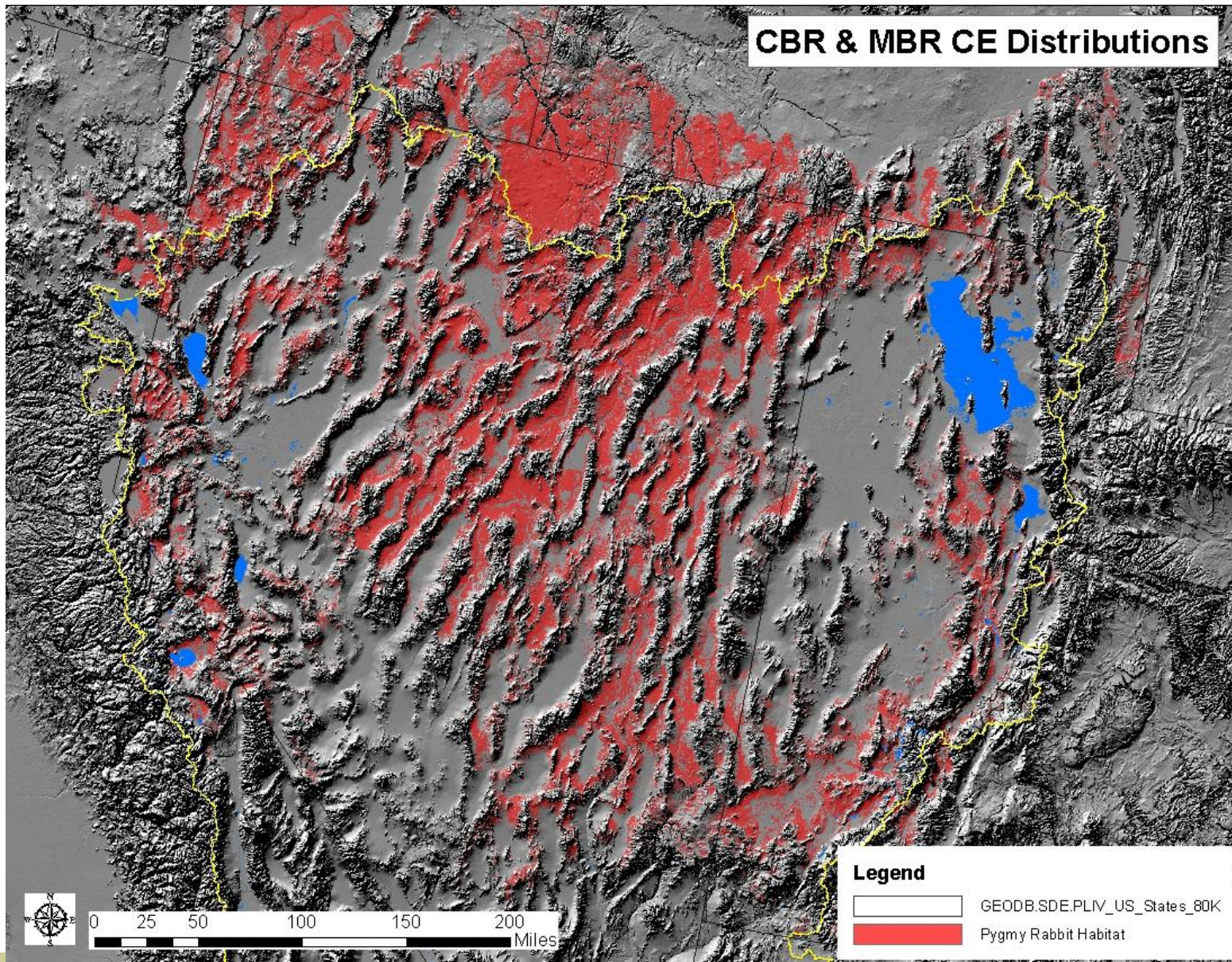
Bighorn Sheep



Desert Tortoise (Mojave)

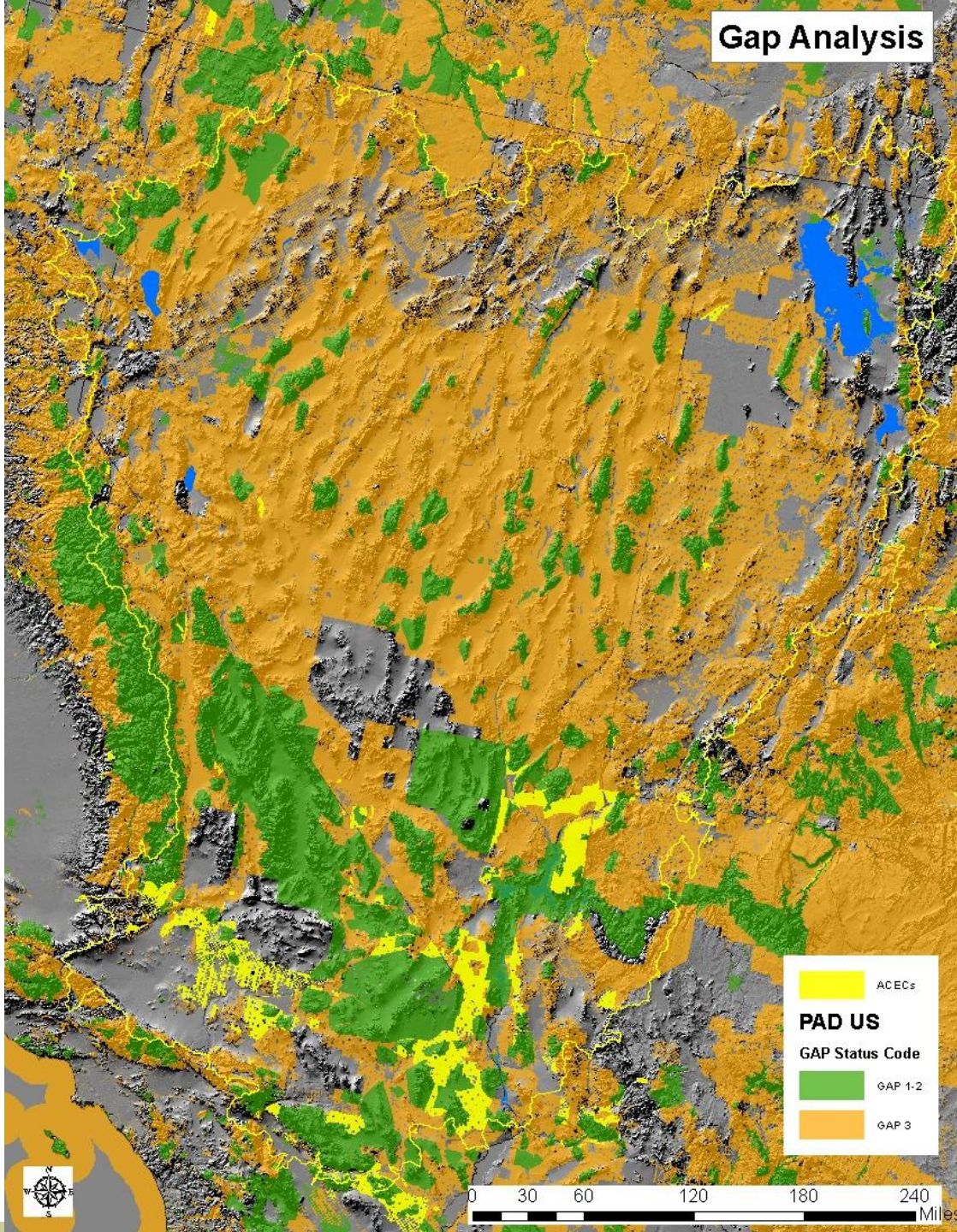


Landscape Species – Pygmy Rabbit



Distributions of Conservation Elements - Where are they?

- **Places – ACECs, other Gap 1-2 lands, all other lands**
- **Assessment – ‘Gap Analysis’**
 1. **Proportional representation of CEs within each lands category**
 2. **Number of CEs within each ACEC**



Gap Analysis – Greater Sage-Grouse

| land category | hectares in land category | % in land category |
|--------------------------|---------------------------|--------------------|
| ACEC | 4,238 | 0.07% |
| GAP 1 or 2, and not ACEC | 366,081 | 5.73% |
| OTHER | 6,014,758 | 94.20% |
| TOTALS | 6,385,077 | 100.00% |

Gap Analysis – Desert Tortoise (Mojave)

| land category | hectares in land category | % in land category |
|--------------------------|---------------------------|--------------------|
| ACEC | 838,856 | 16.43% |
| GAP 1 or 2, and not ACEC | 1,171,301 | 22.94% |
| OTHER | 3,096,688 | 60.64% |
| TOTALS | 5,106,845 | 100.00% |

Gap Analysis – Bighorn Sheep

| land category | hectares in land category | % in land category |
|--------------------------|---------------------------|--------------------|
| ACEC | 239,815 | 5.71% |
| GAP 1 or 2, and not ACEC | 2,677,243 | 63.73% |
| OTHER | 1,283,926 | 30.56% |
| TOTALS | 4,200,984 | 100.00% |

Gap Analysis – Pygmy Rabbit (MBR)

| land category | hectares in land category | % in land category |
|--------------------------|---------------------------|--------------------|
| ACEC | - | 0.00% |
| GAP 1 or 2, and not ACEC | 15,104 | 77.13% |
| OTHER | 4,479 | 22.87% |
| TOTALS | 19,583 | 100.00% |

Gap Analysis – Gila Monster (MBR)

| land category | hectares in land category | % in land category |
|--------------------------|---------------------------|--------------------|
| ACEC | 536,196 | 13.63% |
| GAP 1 or 2, and not ACEC | 1,347,358 | 34.24% |
| OTHER | 2,051,503 | 52.13% |
| TOTALS | 3,935,057 | 100.00% |

Gap Analysis – Vulnerable Species

Assemblage: sandy soils (MBR)

| land category | hectares in land category | % in land category |
|--------------------------|---------------------------|--------------------|
| ACEC | 19,948 | 12.90% |
| GAP 1 or 2, and not ACEC | 49,907 | 32.27% |
| OTHER | 84,812 | 54.84% |
| TOTALS | 154,667 | 100.00% |

Gap Analysis – Vulnerable Species

Assemblage: sandy soils (CBR)

| land category | hectares in land category | % in land category |
|--------------------------|---------------------------|--------------------|
| ACEC | 472 | 0.30% |
| GAP 1 or 2, and not ACEC | 13,161 | 8.23% |
| OTHER | 146,190 | 91.47% |
| TOTALS | 159,823 | 100.00% |

Gap Analysis – Springs and Seeps (CBR)

| land category | hectares in land category | % in land category |
|--------------------------|---------------------------|--------------------|
| ACEC | 3 | 0.25% |
| GAP 1 or 2, and not ACEC | 137 | 12.48% |
| OTHER | 958 | 87.27% |
| TOTALS | 1,098 | 100.00% |

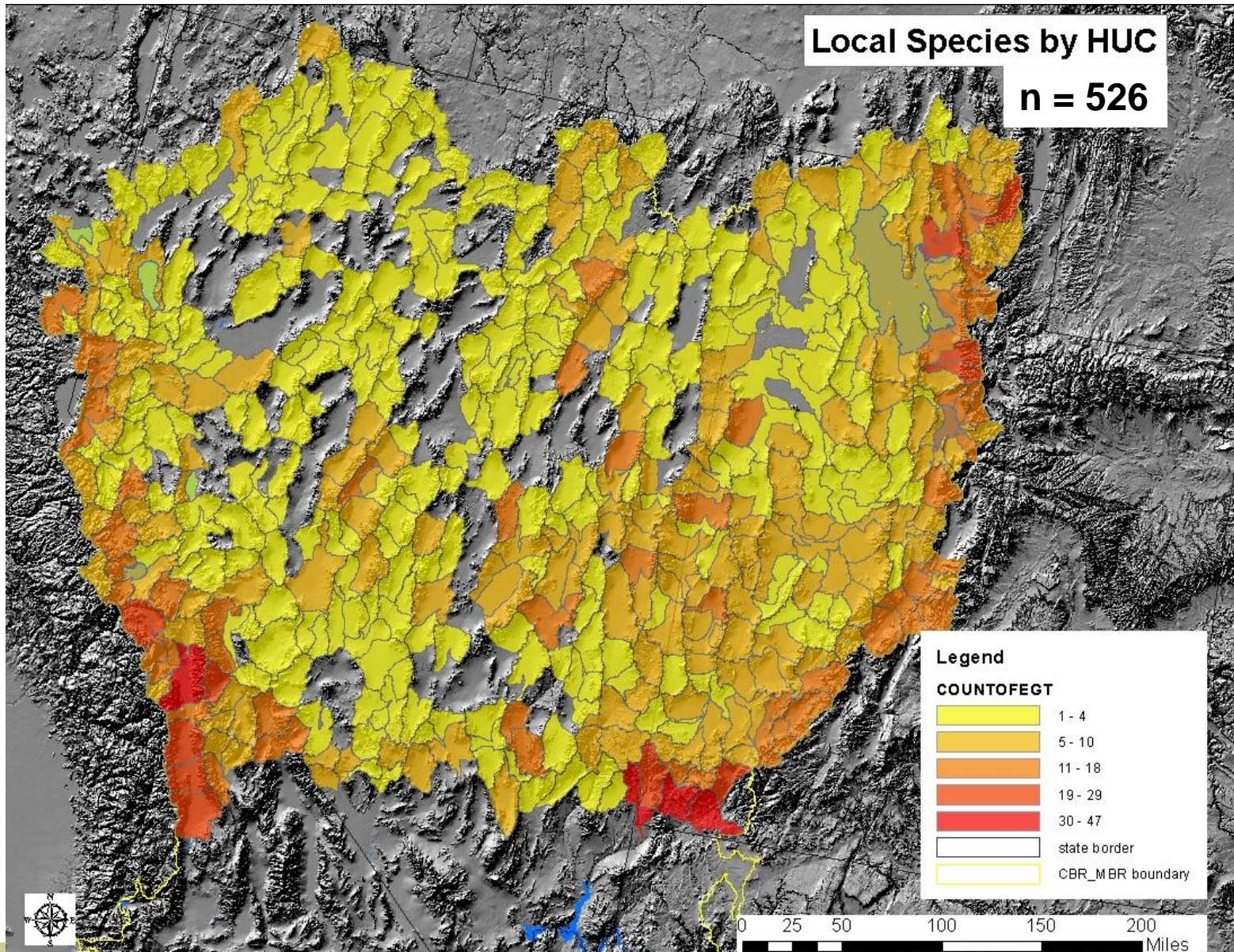
Gap Analysis – Springs and Seeps (MBR)

| land category | hectares in land category | % in land category |
|--------------------------|---------------------------|--------------------|
| ACEC | 9 | 6.37% |
| GAP 1 or 2, and not ACEC | 65 | 46.62% |
| OTHER | 66 | 47.01% |
| TOTALS | 140 | 100.00% |

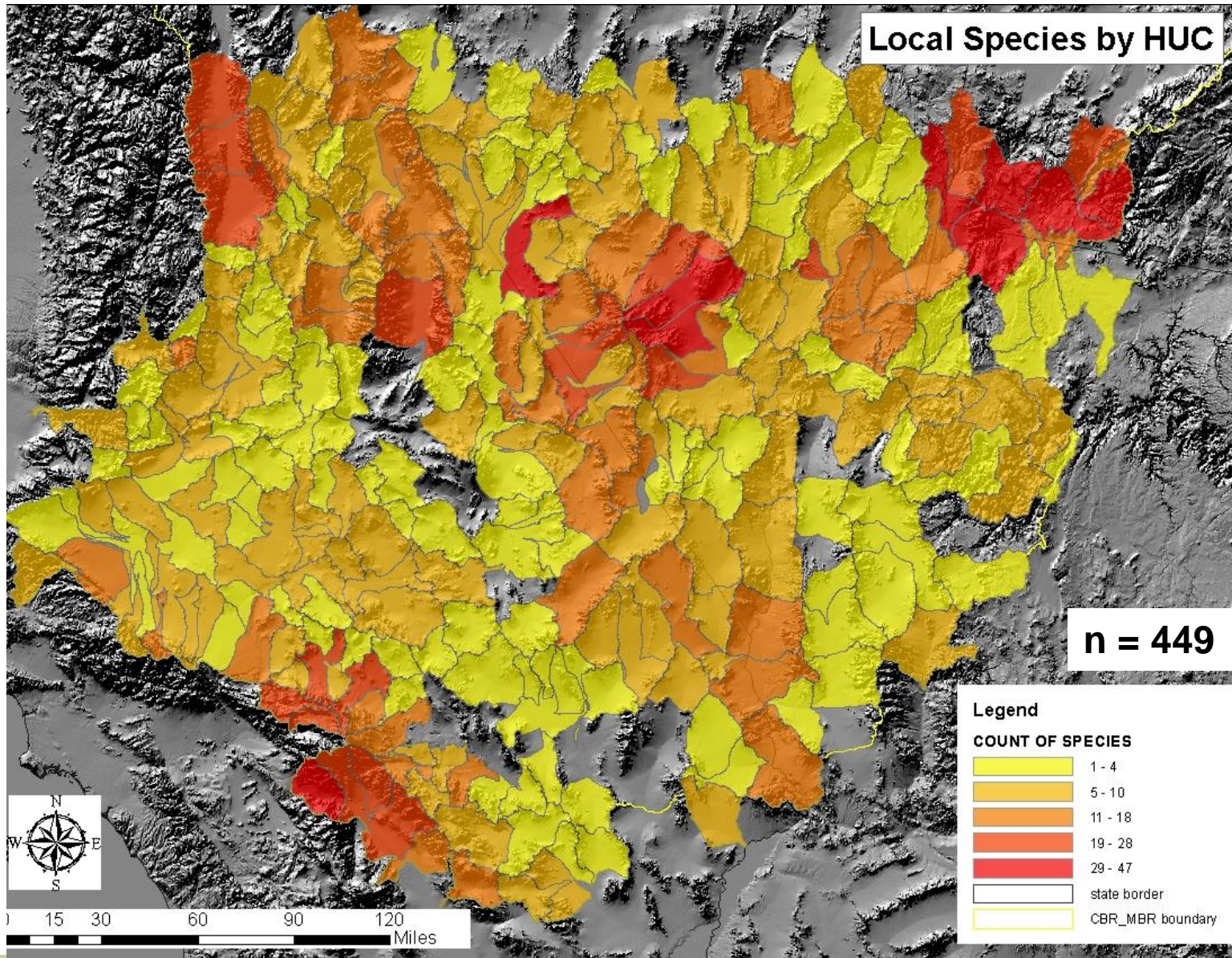
Gap Analysis – ACEC richness

| REA | ACEC NAME | HECTARES | Total number of CE |
|-----|---|----------|--------------------|
| CBR | Old Central Pacific Railroad Grade Area Of Critical Environmental Concern | 1,989 | 6 of 9 |
| CBR | Bonneville Salt Flats Area Of Critical Environmental Concern | 12,219 | 0 |
| MBR | Amargosa River | 7,823 | 7 of 9 |
| MBR | Amboy Crater | 259 | 0 |

Local Species Summaries



Local Species Summaries



Distributions of Change Agents - Where are they?

**Development CAs (those we
manipulated/modeled)**

- **Recreation**
- **Mines & Landfills**

**Renewable Energy (current, planned,
potential)**

Invasive Plants



Terrestrial Invasive CAs

MQs

- Where are invasive elements most likely to foster changes.

Enabling our answering MQs like....

- Where will target soil types overlap with CAs?
- Where will sensitive ecosystems overlap CAs?
- Where will there be invasive restoration opportunities?
- Where will fire potential change due to invasive?

Terrestrial Invasives

■ Annual Grasses

- 47 species samples present (LandFire)
 - N= 6,820 points, 7,269 records
- 4 species make up 96% (*Bromus madritensis* - 8.3%, *Bromus rubens* - 4.69%, *Bromus tectorum* - 75.85%, *Schismus barbatus* - 7.98%)

FIVE Models indicating relative vulnerability of:

<5% cover

5-15% cover

16-25% cover

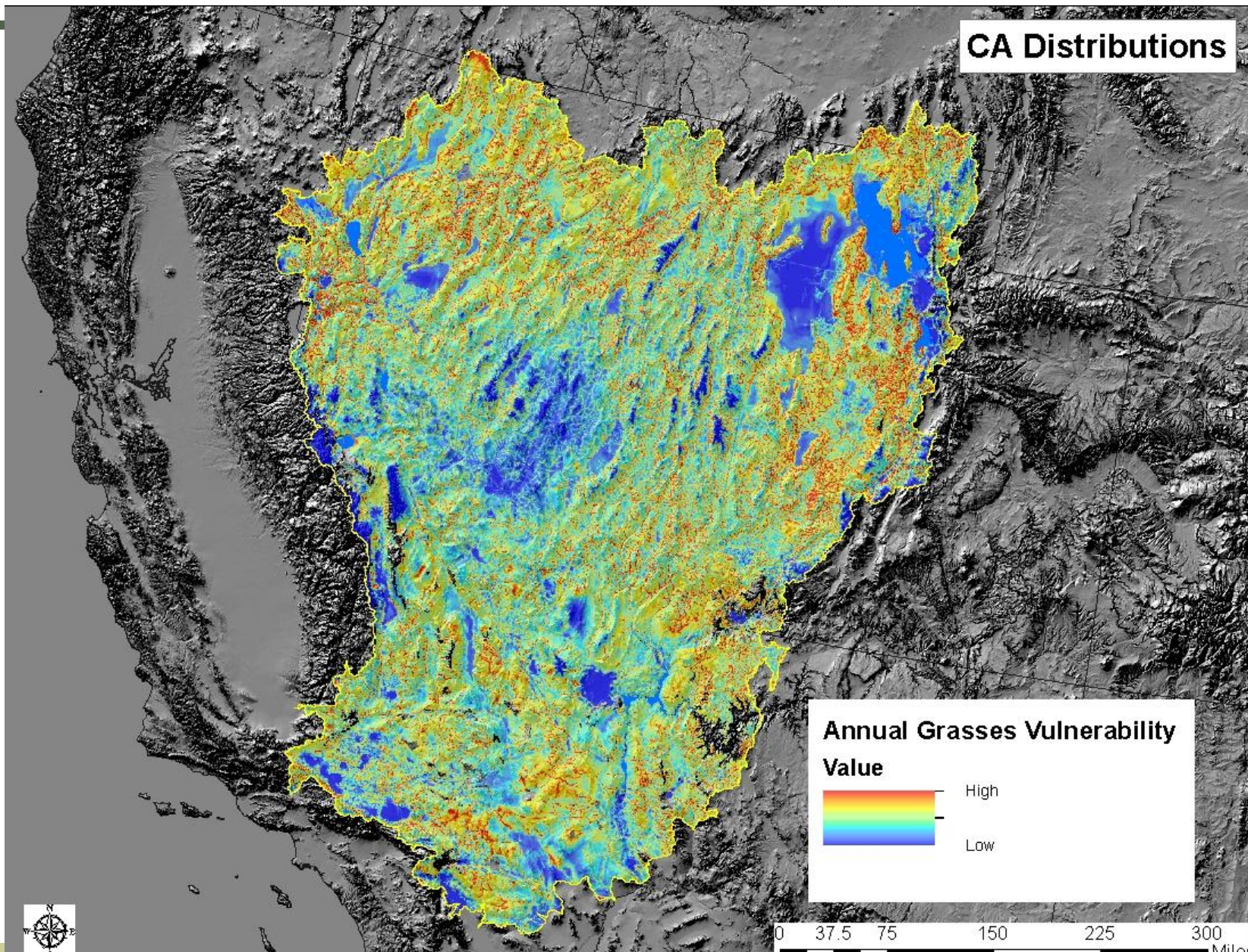
26-45% cover

>45% cover

Models may be applied and summarized alone or stacked



Annual Grasses- Results

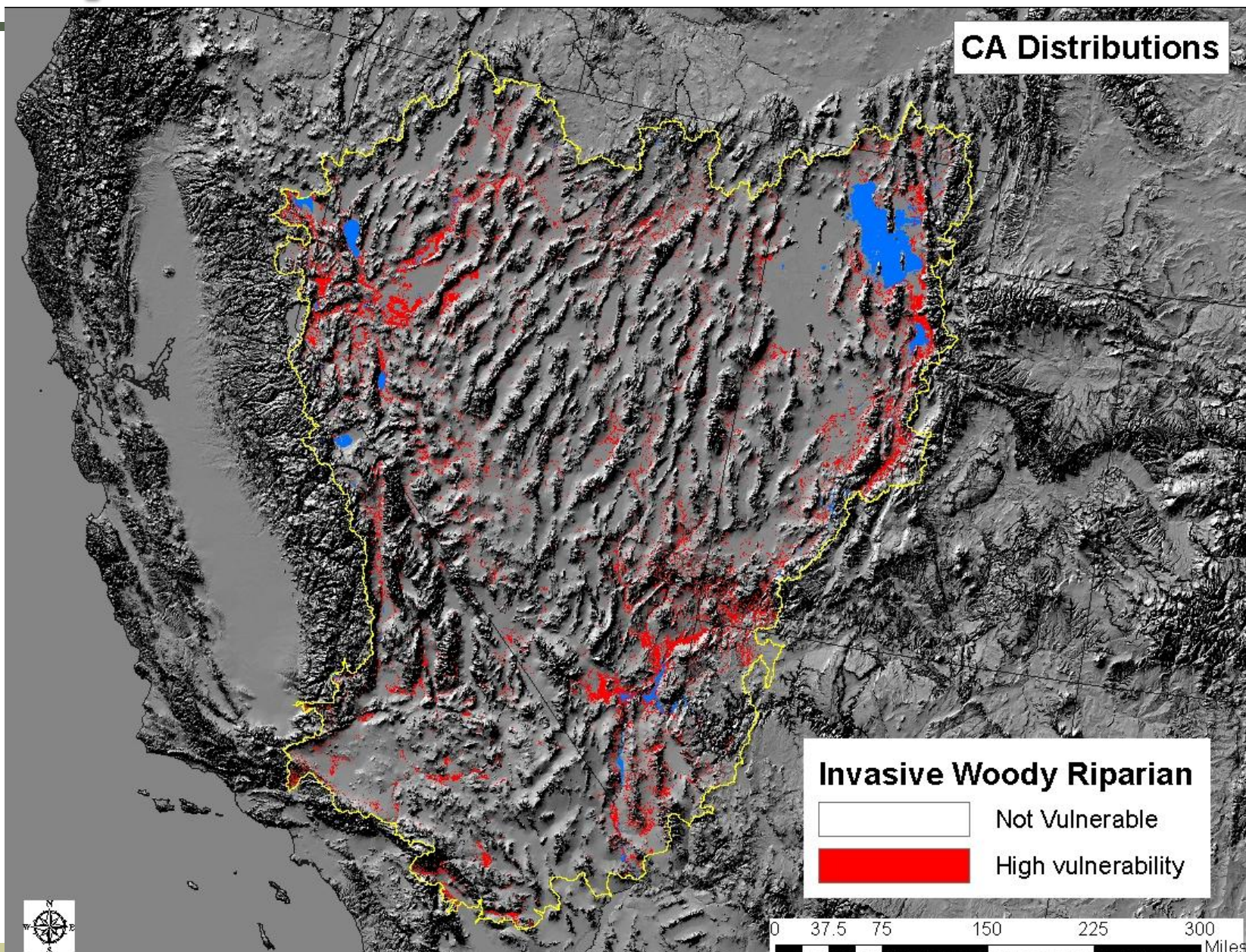


Riparian Tree-Shrub

- 3 species make up 99% of occurrences (95% tamarisk, 2% Russian Olive, 2% Water hemlock)

One model indicating relative vulnerability of for presence of these invasive taxa

Riparian Tree-Shrub - Results



Forbs – Annual/Biennial/Perennial

■ Forbs

- many species/subspecies (N=3398 points, 10567 records)
 - No dominant species
- Still need BLM guidance on species selection for final models



Break



Answering “where do CAs overlap CEs”: Current land use scenario

AMT input: confirm CA approach; reporting units and metrics options



Current Scenario

Primarily addresses MQs for where are
CEs & CAs and current ecological integrity

- Existing land use and infrastructure
- Major energy/infrastructure projects approved as of May 2011
- Current invasives distribution
- Mapped fire events

Current Scenario

- Where are current locations of development CAs?

| Area | Land Use |
|---------------------|--|
| 40,564,982.92 acres | Total Area |
| 27,599.66 acres | Renewable Energy Wind |
| 22,661.54 acres | Renewable Energy Solar |
| 2,571.58 acres | Renewable Energy Geothermal |
| 724,902.2 acres | Roads Local and Neighborhood |
| 52,928.26 acres | Roads Secondary |
| 24,919.4 acres | Roads Primary |
| 131,280.38 acres | Roads Unimproved |
| 6,185.52 acres | Mines |
| 521.84 acres | Oil and Gas Wells |
| 5,583.38 acres | Landfills and Refuse Pits |
| 131,623.14 acres | Transmission lines |
| 58,023.24 acres | Pipelines |
| 149,124.14 acres | Row crops, orchards and irrigated pastures |
| 17,996.44 acres | Military Urbanized Area |
| 3,049,003.32 acres | Urban very low density (exurban) |
| 2,321,808.72 acres | Private undeveloped |
| 565,600.86 acres | Urban low density (suburban) |
| 131,550.76 acres | Urban high density |
| 32,952,024.82 acres | Public Lands (little or no infrastructure) |

Development Change Agents

- **Recreation**
- **Hydrologic Change Agents**
- **Mining & Refuse Management**

REA Modeling

- **Urbanization**
- **Renewable & Extractive Energies**

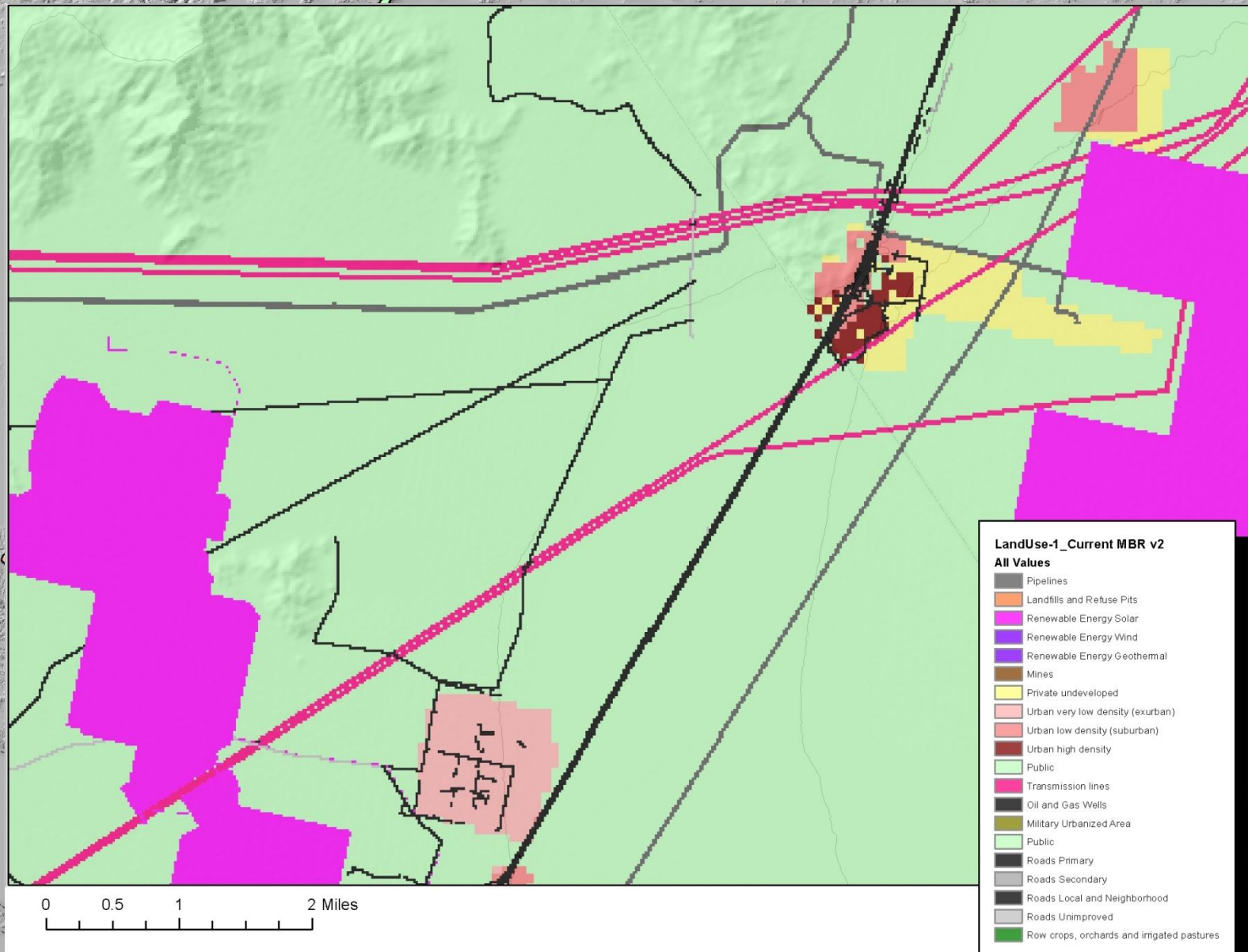
Existing data, 3rd party models

- **Infrastructure**
- **Military use/Expansion**
- **Agriculture**

Existing data

- **Livestock, Wild Horses & Burros**

HMA and HA as reporting units

**Current MBR v2**

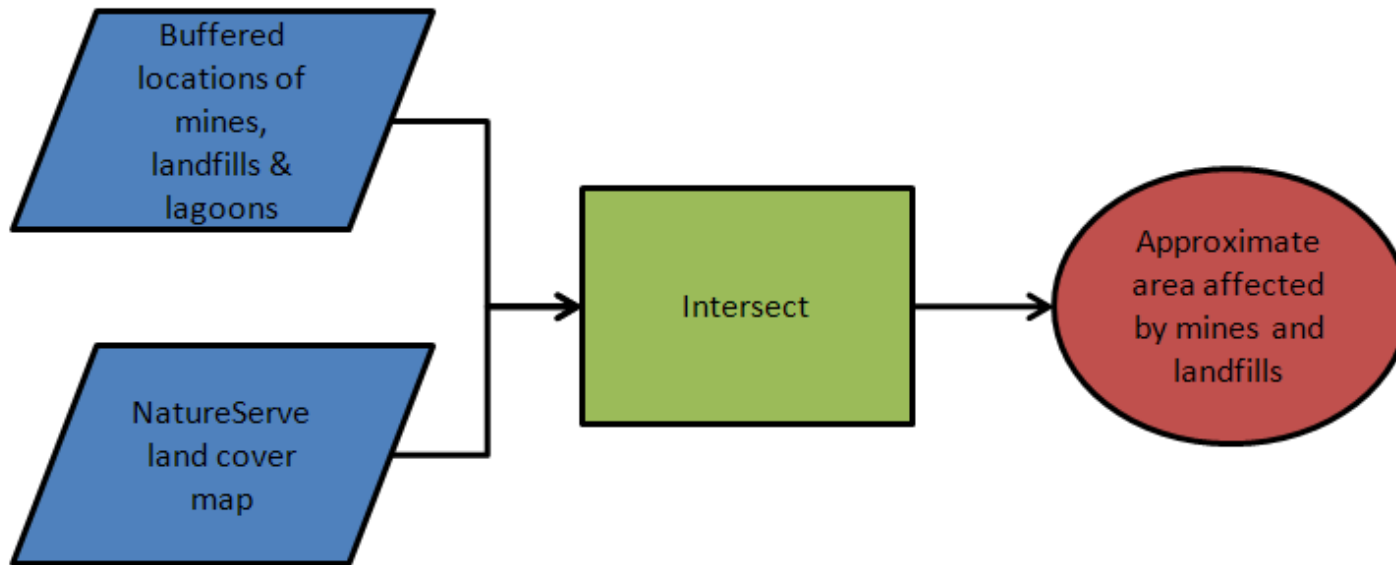
Refuse Pits
Renewable Energy Solar
Renewable Energy Wind
Renewable Energy Geothermal
Private undeveloped
Urban very low density (exurban)
Urban low density (suburban)
Urban high density
Transmission lines
Oil and Gas Wells
Military Urbanized Area
Public
Roads Primary
Roads Secondary
Roads Local and Neighborhood
Roads Unimproved
Row crops, orchards and irrigated pastures

0 30 60 120 Miles

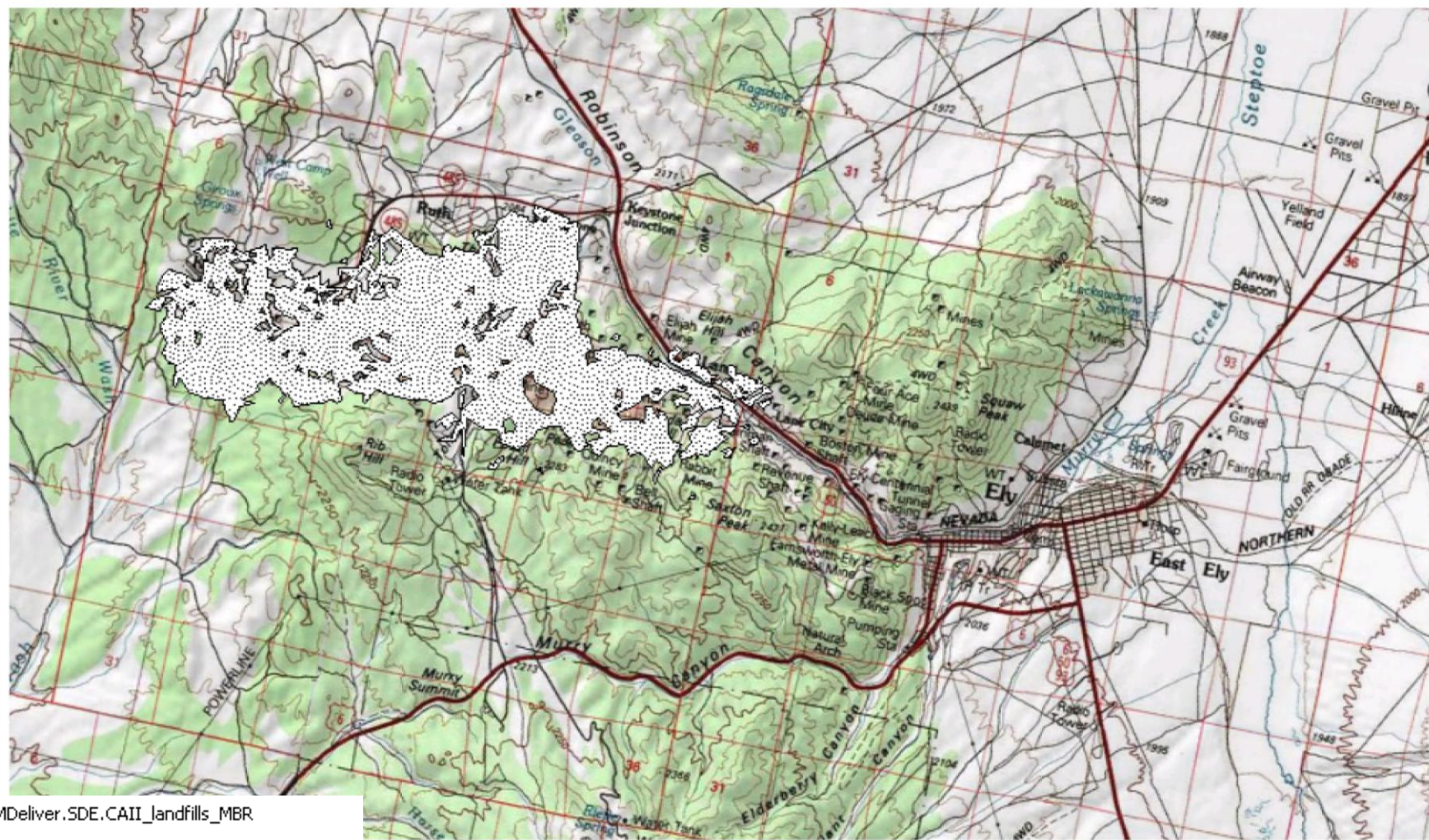
Roads Primary
Roads Secondary
Roads Local and Neighborhood
Roads Unimproved
Row crops, orchards and irrigated pastures

Mines and Landfills

- Modeled change agent
 - Active Mines
 - Landfills & Refuse Areas (status unknown)
 - Sources of data:
 - Mining: MRDS, NV BMRR
 - Refuse management: SAGEMAP

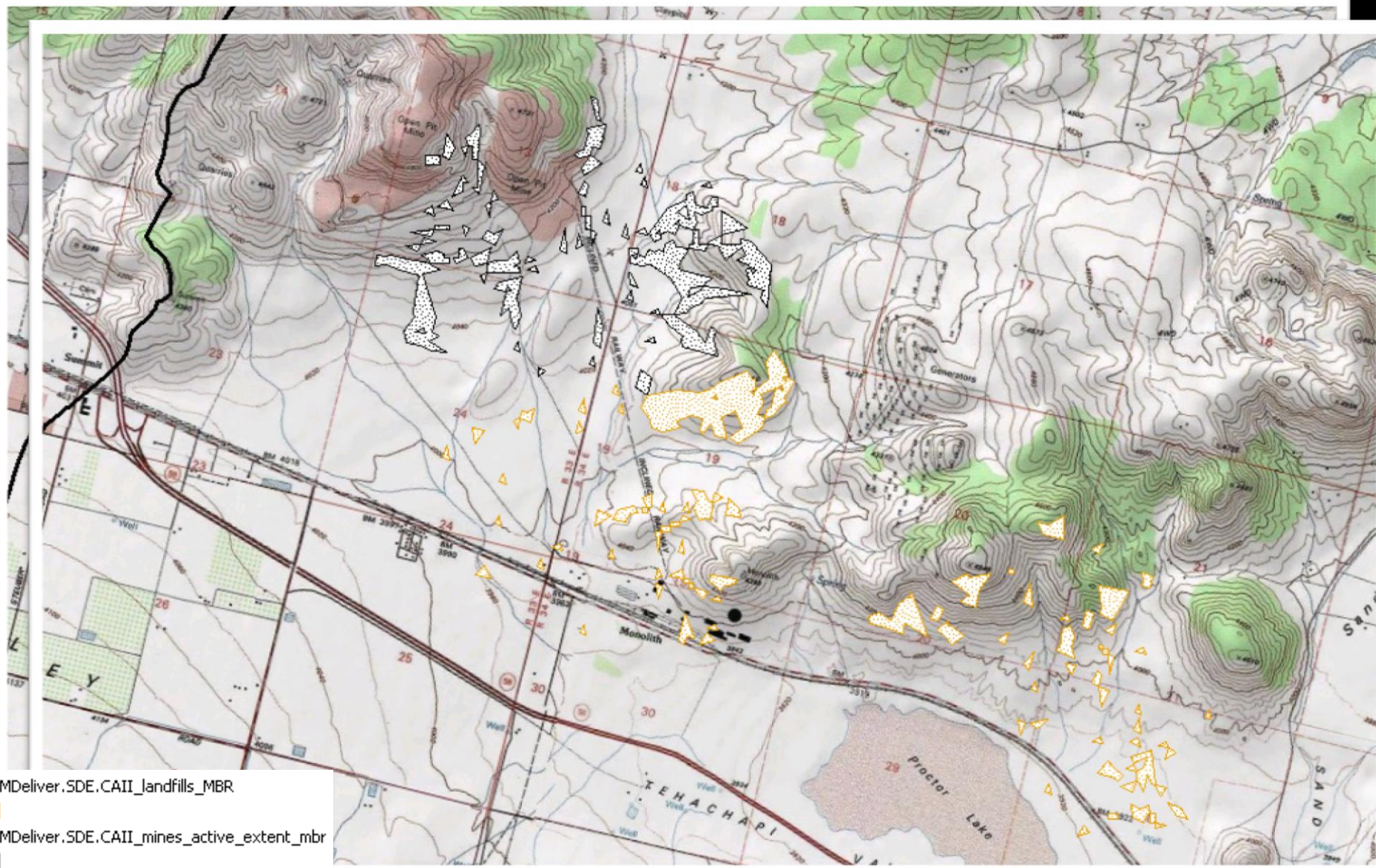


Mines and Landfills



- ☐ BLMDeliver.SDE.CAII_landfills_MBR
- ☐ BLMDeliver.SDE.CAII_mines_active_extent_mbr

Mines and Landfills



Landfills and Mines- Error Reporting

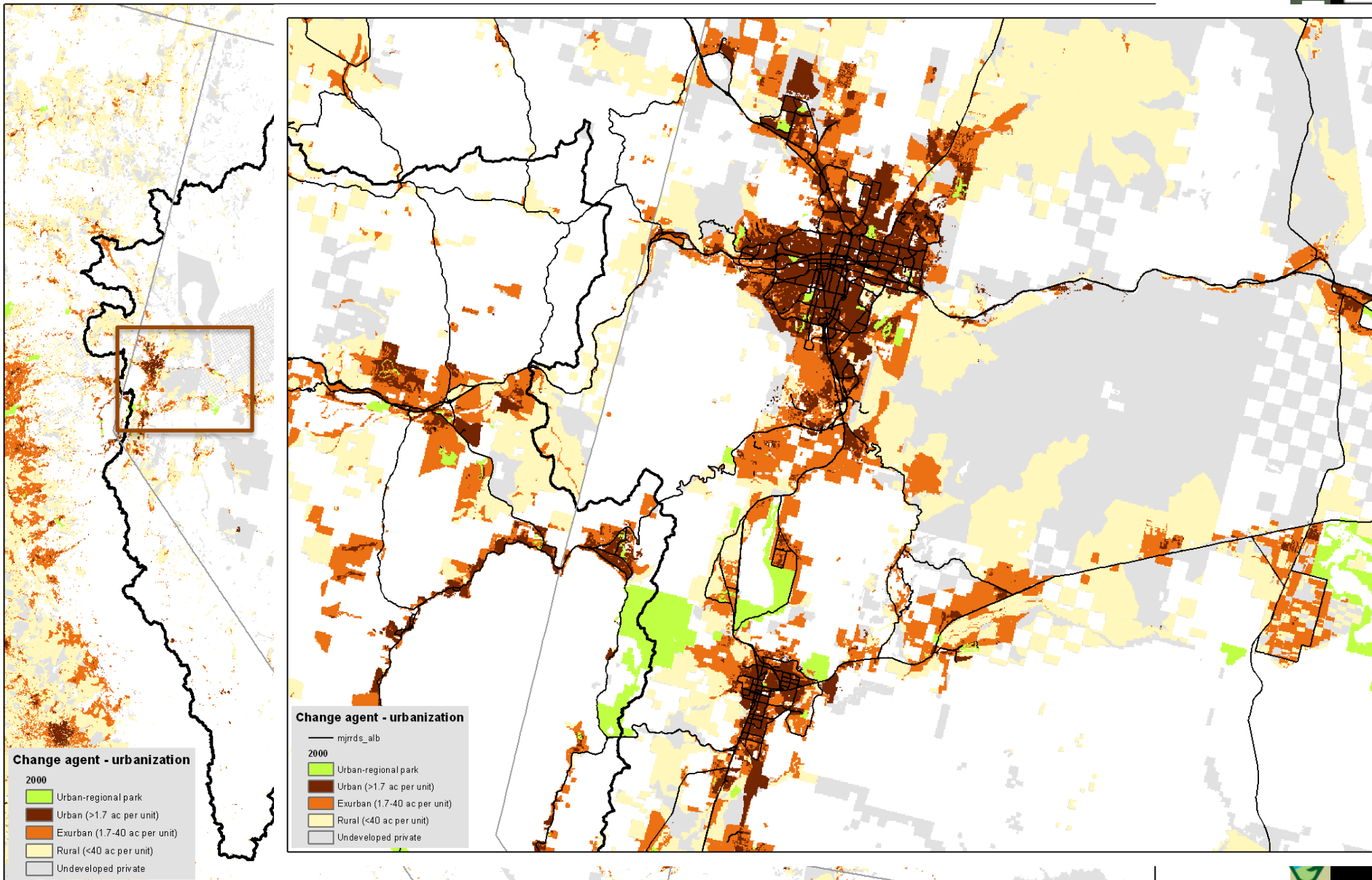
- MBR Landfills/Refuse Areas (195), sample of 20
 - 10% are true landfills
 - 60% are areas heavily disturbed by humans: mines, quarries, shooting ranges or junkyards
 - 30% are lightly disturbed areas or naturally disturbed areas: low density urban areas, geothermal areas, scree or dune fields
- MBR Active Mines (177), sample of 20
 - 45% are mining operation
 - 30% are areas heavily disturbed by humans: refuse areas, abandoned quarries, embankment areas
 - 25% are lightly disturbed areas or naturally disturbed areas: low density urban areas, scree or dune fields
- Similar pattern of accuracy for CBR features



Urbanization

ICLUS/SERGoM v1.2. Population projections open-source, consistent with IPCC Climate Change scenarios (Bierwagen et al. 2010)

BLM
Rapid



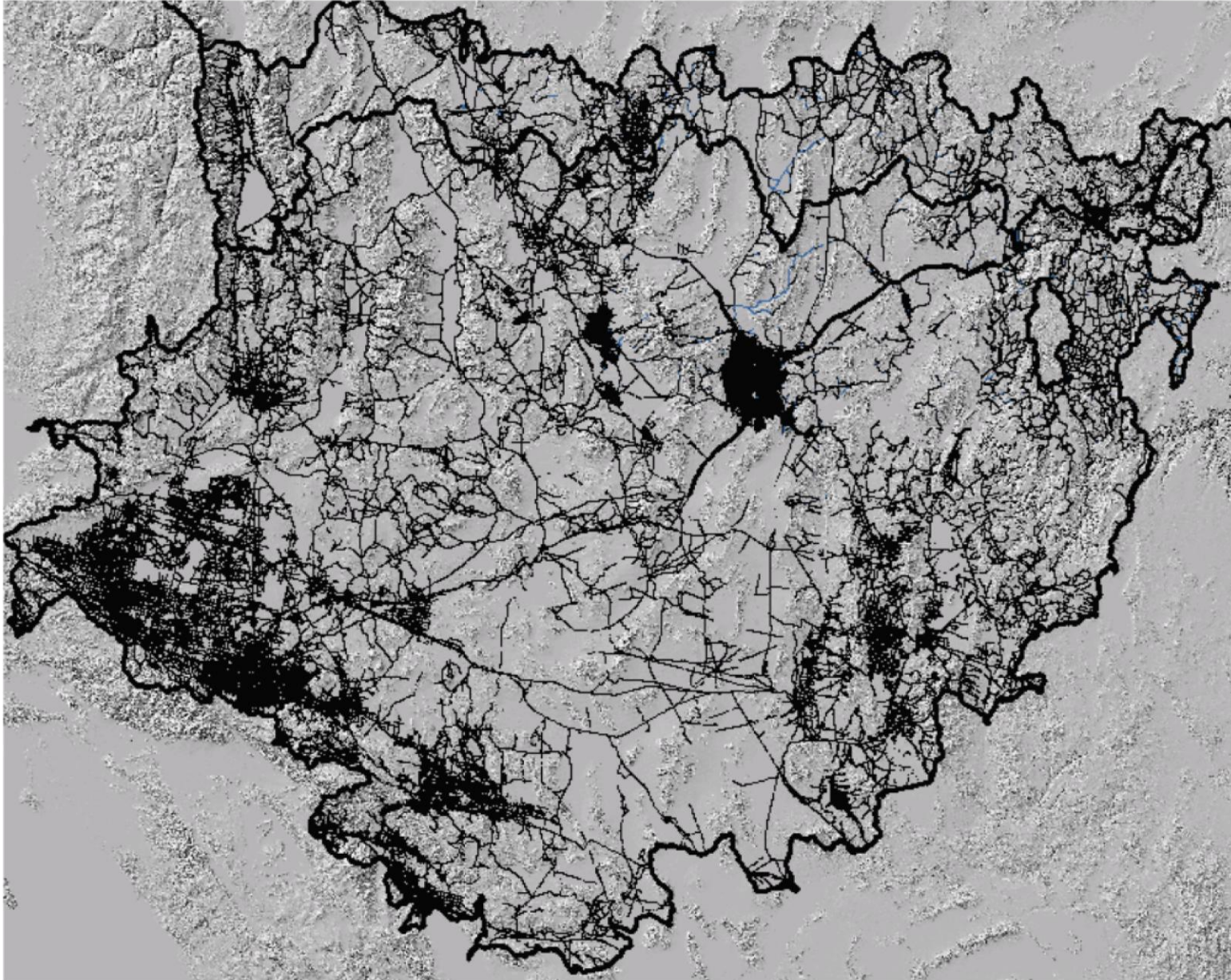
Roads

- BLM Linear Features Layer
 - Collected by 11 BLM states, includes all major/minor roads as well as trails
 - 2010 TIGER as base plus USFS, BLM 100k and BLM GTLF (state & FO data)
 - Transferred to NatureServe in June, NS processing included merging state data, clip to ecoregion and attribute work

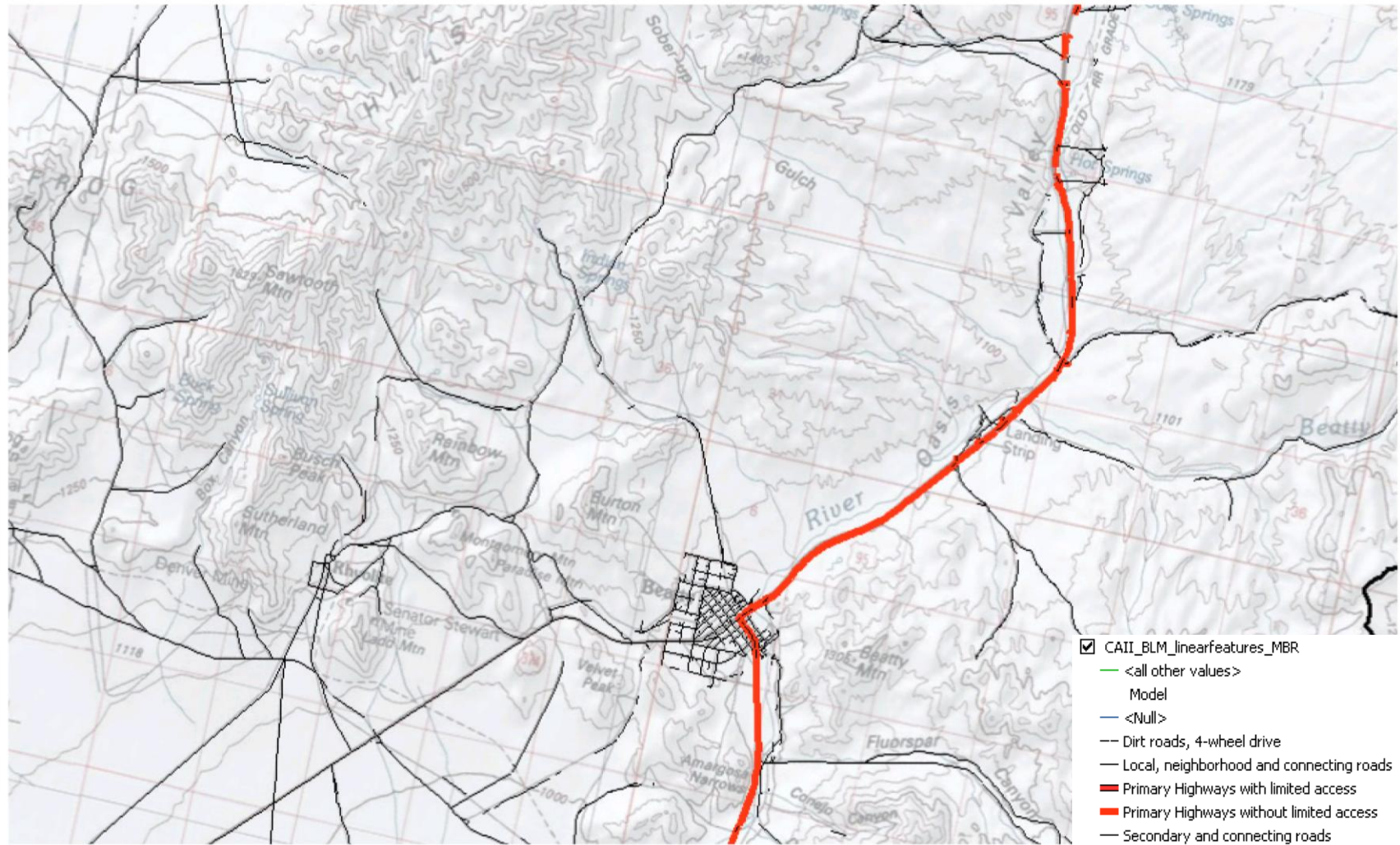
Roads

BLM

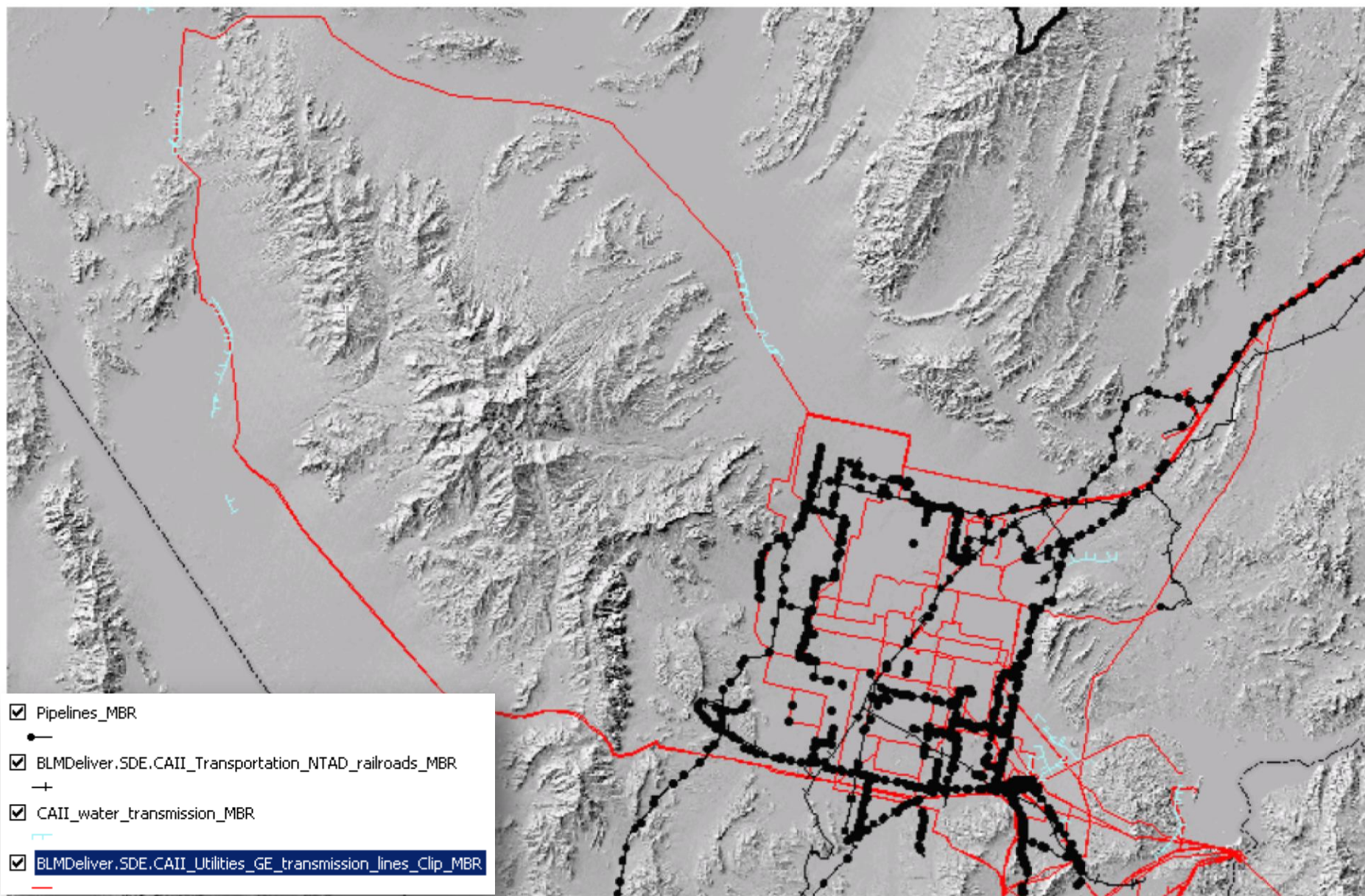
Rapid Ecoregional Assessment



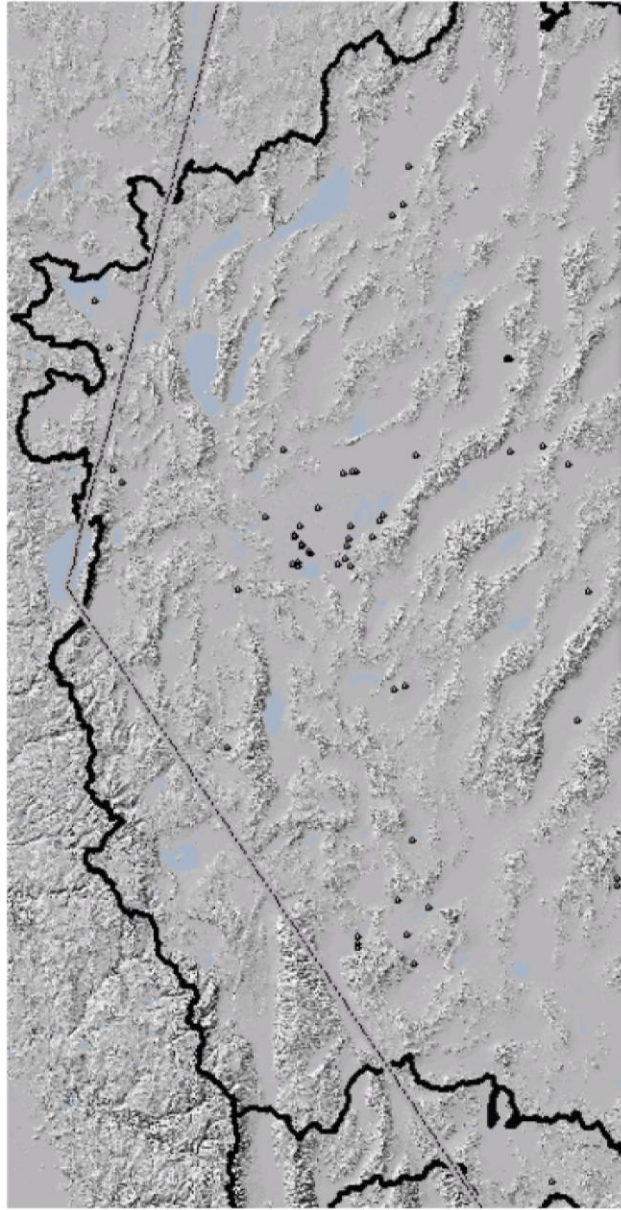
Roads



Other Linear Infrastructure

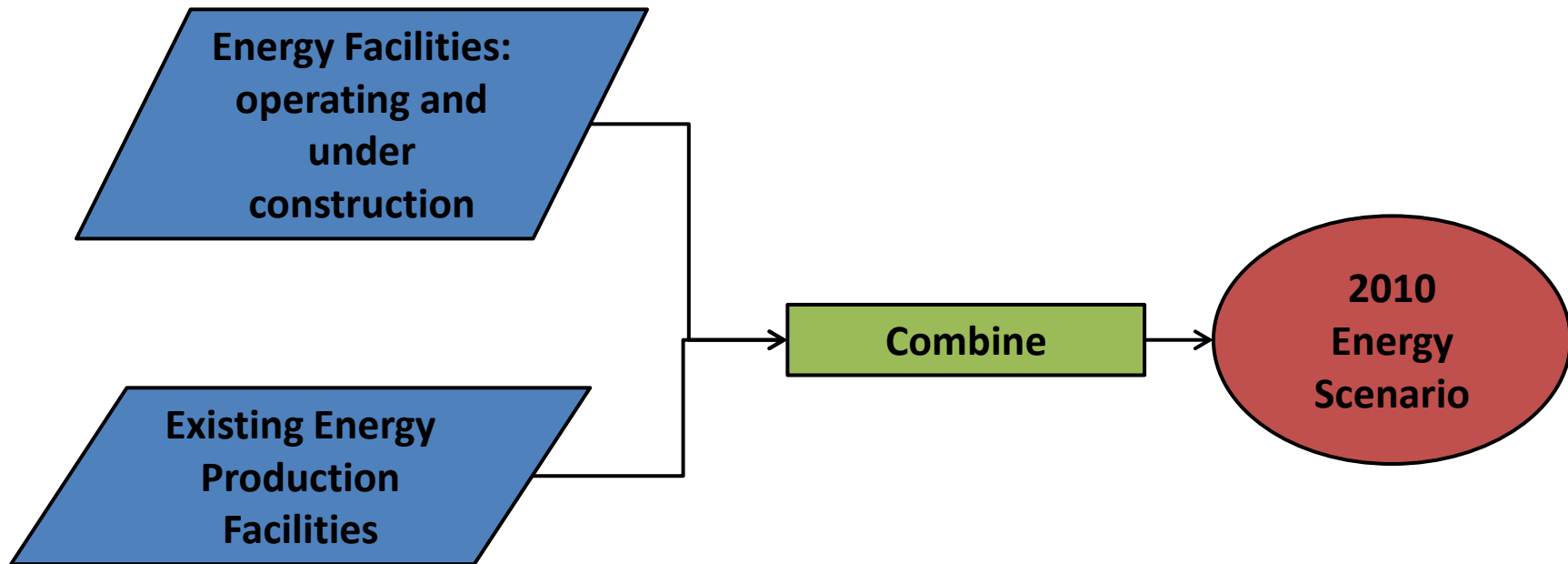


Oil and Gas



Renewable Energy

Current Scenario



Renewable Energy

■ Central Basin and Range

| FID | ProjectNam | SerialNumb | Commodity | Scenario | ACRES |
|-----|---------------------------|-------------|--------------------------|----------|-----------------|
| | 0 Luning Solar | NVN XXXXXX | Wind Energy Facilities | Present | 715.7 |
| | 1 Crescent Dunes | NVN XXXXXX | Wind Energy Facilities | Present | 2075.5 |
| | 2 Spring Valley Wind | NVN-084148 | Wind Energy Facilities | Present | 7090.9 |
| | 3 Salt Wells | NVN 077271 | Geothermal Energy Facil* | Present | 2551.1 |
| | 4 Mammoth PLES1 | CACA 011667 | Geothermal Energy Facil* | Present | 1341.5 |
| | 5 Steamboat Galena Hills | NVN 063124 | Geothermal Energy Facil* | Present | 501.6 |
| | 6 Brady Ormat | NVN 046566 | Geothermal Energy Facil* | Present | 120.7 |
| | 7 Desert Peak | NVN 013072A | Geothermal Energy Facil* | Present | 640.2 |
| | 8 Brady Ormat | NVN 065561 | Geothermal Energy Facil* | Present | 362.5 |
| | 9 Dixie Valley | NVN 012862 | Geothermal Energy Facil* | Present | 1627.9 |
| | 10 Stillwater | NVN 051956 | Geothermal Energy Facil* | Present | 120.9 |
| | 11 Empire | NVN 042707 | Geothermal Energy Facil* | Present | 1793.4 |
| | 12 Blue Mountain | NVN 058196 | Geothermal Energy Facil* | Present | 667.2 |
| | 13 Wabuska | NVN 079988 | Geothermal Energy Facil* | Present | 1517.2 |
| | 14 Steamboat Galena Hills | NVN 029821 | Geothermal Energy Facil* | Present | 39.7 |
| | 15 Steamboat Galena Hills | NVN 012085 | Geothermal Energy Facil* | Present | 501.6 |
| | 16 Desert Peak | NVN 085777 | Geothermal Energy Facil* | Present | 479.6 |
| | 17 Blue Mountain | NVN 086668 | Geothermal Energy Facil* | Present | 596.6 |
| | 18 Thermo | UTU 071373 | Geothermal Energy Facil* | Present | 1786.5 |
| | 19 Roosevelt | UTU 027386 | Geothermal Energy Facil* | Present | 1171.3 |
| | 20 Dixie Valley | NVN 012863 | Geothermal Energy Facil* | Present | 1871.1 |
| | 21 Beowawe | NVN 010916 | Geothermal Energy Facil* | Present | 1330.2 28902.77 |

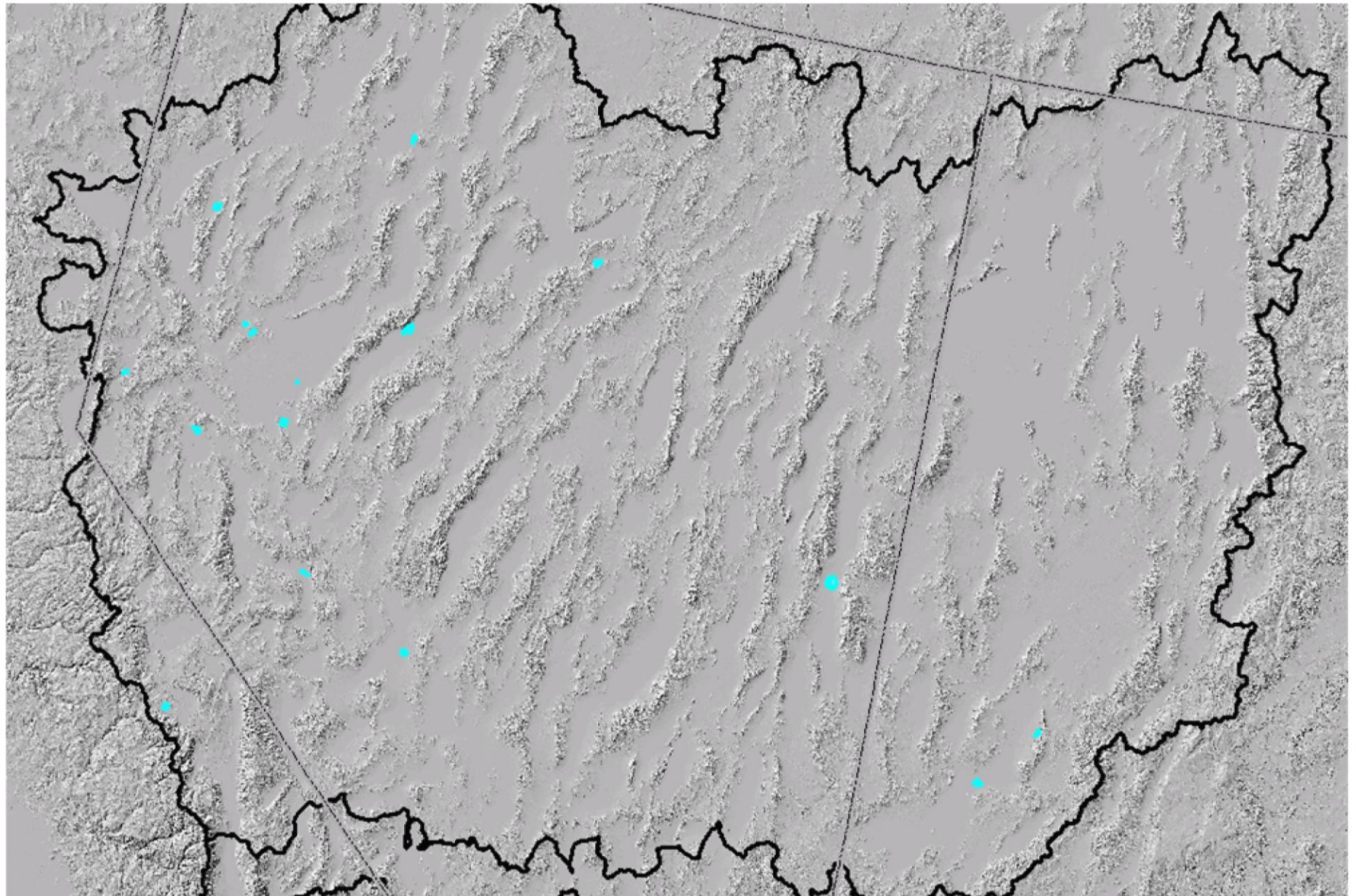


Renewable Energy

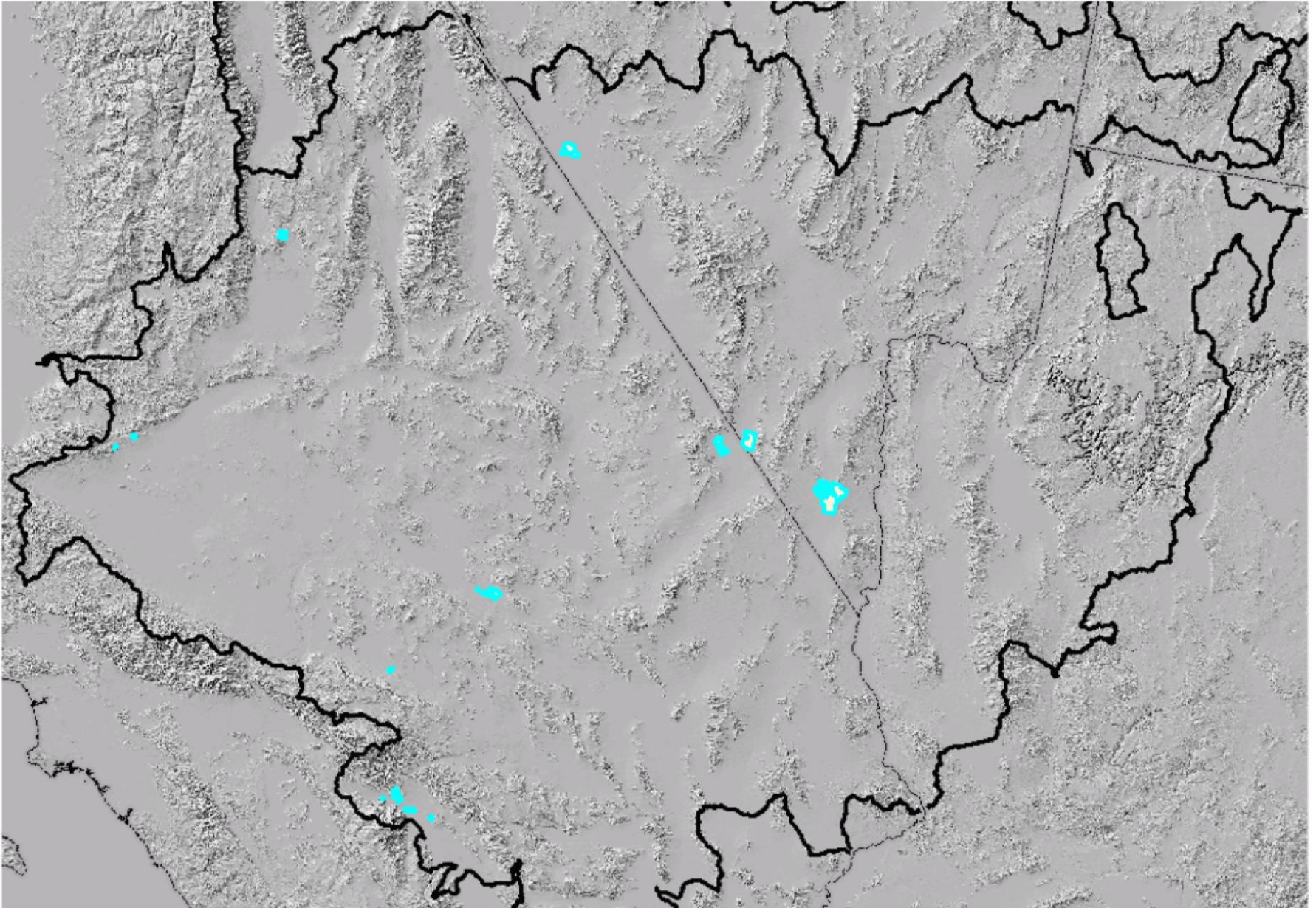
■ Mojave Basin and Range

| FID | ProjectNam | SerialNumb | Commodity | SCENARIO | ACRES |
|-----|---|-------------|-------------------------|----------|---------------|
| | 0 Chevron Energy Solutions - Lucerne Valley | CACA 049561 | Solar Energy Facilities | Present | 461.1 |
| | 1 Solar Partners I - Ivanpah 2 | CACA 048668 | Solar Energy Facilities | Present | 3479.4 |
| | 2 Calico Solar, LLC - Calico | CACA 049537 | Solar Energy Facilities | Present | 4604.4 |
| | 3 Silver State Solar (combined South and North proj)* | NVN-085077 | Solar Energy Facilities | Present | 7850.9 |
| | 4 Amargosa Farm Road, Amargosa Valley, Nye County | NVN-084359 | Solar Energy Facilities | Present | 6279.7 |
| | 5 BP-Edom Hills Project | CACA 014632 | Wind Energy Facilities | Present | 364.7 |
| | 6 Mark Technologies Corp. - Mesa | CACA 041695 | Wind Energy Facilities | Present | 277.3 |
| | 7 Oak Creek Energy - Tehachapi | CACA 013528 | Wind Energy Facilities | Present | 159.5 |
| | | CACA | | | |
| | 8 PAMC Management Corp. - Alta Mesa | 011688A | Wind Energy Facilities | Present | 874.2 |
| | 9 FPL Energy - Cabazon Wind | CACA 013198 | Wind Energy Facilities | Present | 210.2 |
| | 10 Desert Wind Energy | CACA 015549 | Wind Energy Facilities | Present | 79.1 |
| | 11 Energy Unlimited Inc. - Eastridge | CACA 017192 | Wind Energy Facilities | Present | 77.4 |
| | 12 DIF Wind Farms V | CACA 037869 | Wind Energy Facilities | Present | 39.3 |
| | 13 DIFCO - Whitewater Floodplain | CACA 015562 | Wind Energy Facilities | Present | 962.5 |
| | 14 Cameron Ridge, LLC | CACA 009501 | Wind Energy Facilities | Present | 545.3 |
| | 15 San Gorgonio Farms - Whitewater Hill | CACA 009755 | Wind Energy Facilities | Present | 13.4 |
| | 16 Searchlight Wind Energy, Searchlight, Nevada | NVN-084626 | Wind Energy Facilities | Present | 24049.1 |
| | | CACA | Geothermal Energy | | |
| | 17 Navy BLM China Lake | 011402 | Facil* | Present | 2569.6 |
| | | CACA | Geothermal Energy | | |
| | 18 Navy BLM China Lake | 011402 | Facil* | Present | 2569.6 |
| | | CACA | Geothermal Energy | | |
| | 19 Navy BLM China Lake | 022512 | Facil* | Present | 40.7 |
| | | CACA | Geothermal Energy | | |
| | 20 Navy BLM China Lake | 025690 | Facil* | Present | 631.5 56138.9 |

Renewable Energy- CBR



Renewable Energy- MBR



Recreation models

| Type | Constraints | "Gates" | Destinations |
|---|--|--|--|
| R - general | Public lands but not DOD/DOE | None | None |
| Ra - Boater/fisher *assume 10 mph boat speed | Reservoirs, rivers, Non-wilderness, non-DOD | Marinas, boat ramps | Beaches, fishing holes, camping spots |
| Re - OHV enthusiast *assume no highway travel | Public, non- wilderness, non-DOD | OHV staging areas, trail heads | Potentially: race courses, ravines, washes |
| Rf – Hiker, cyclist | Public, non-DOD | Trail heads, campgrounds, RCAs/LTVAs | Springs, slot canyons, peaks, arches |
| Rr - OHV hunter/rock hounder | Public, non- wilderness, non-DOD | OHV trail heads, campgrounds, RCAs/LTVAs | Caves, mines, ruins |

Recreation

Type

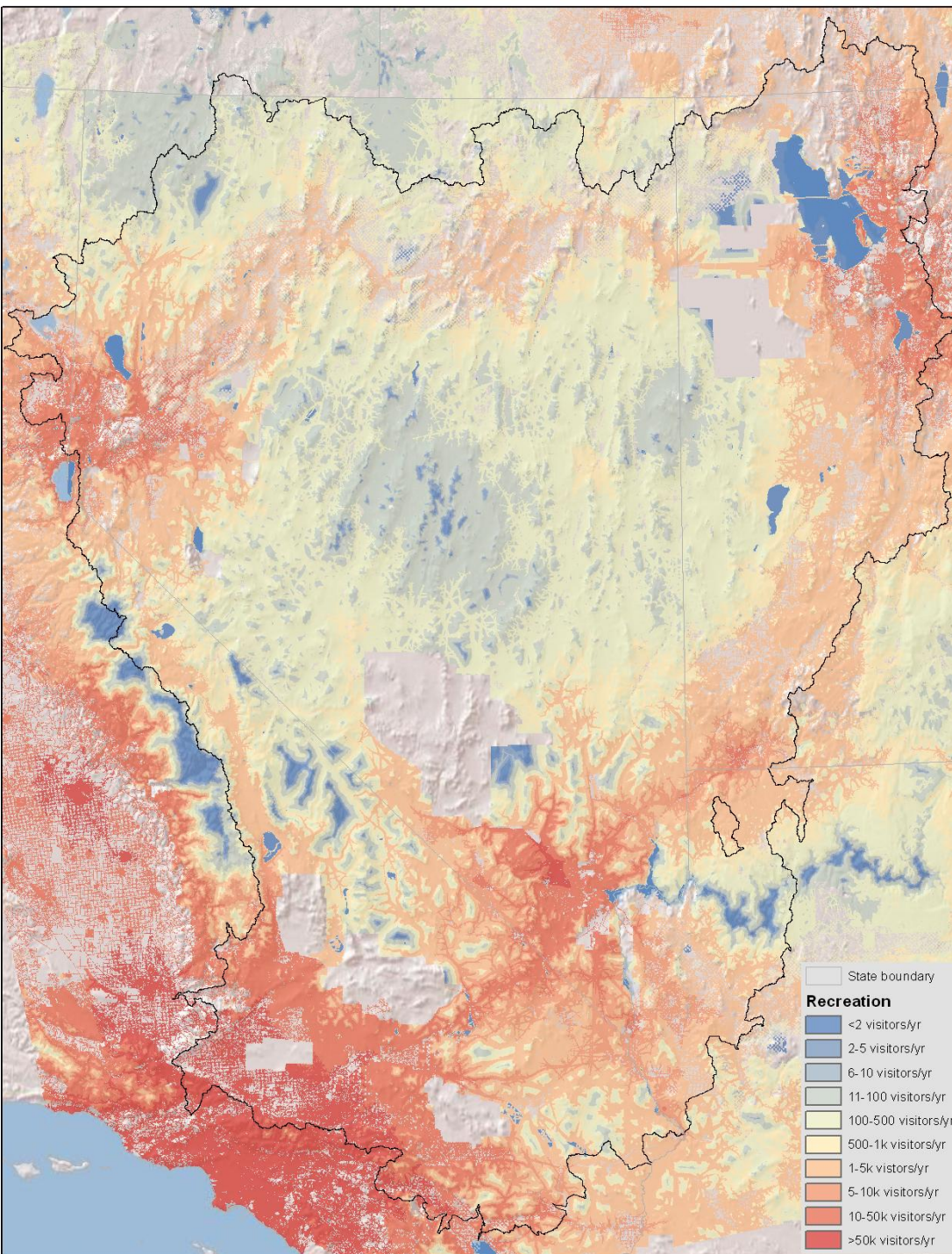
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Ra -
Boater/fisherman
*assume 10 mph
boat speed

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*assume no
highway travel

R - Hiker, cyclist

Rr - OHV
hunter/rock
climber



ons

fishing holes,
spots

ly: race
ravines,

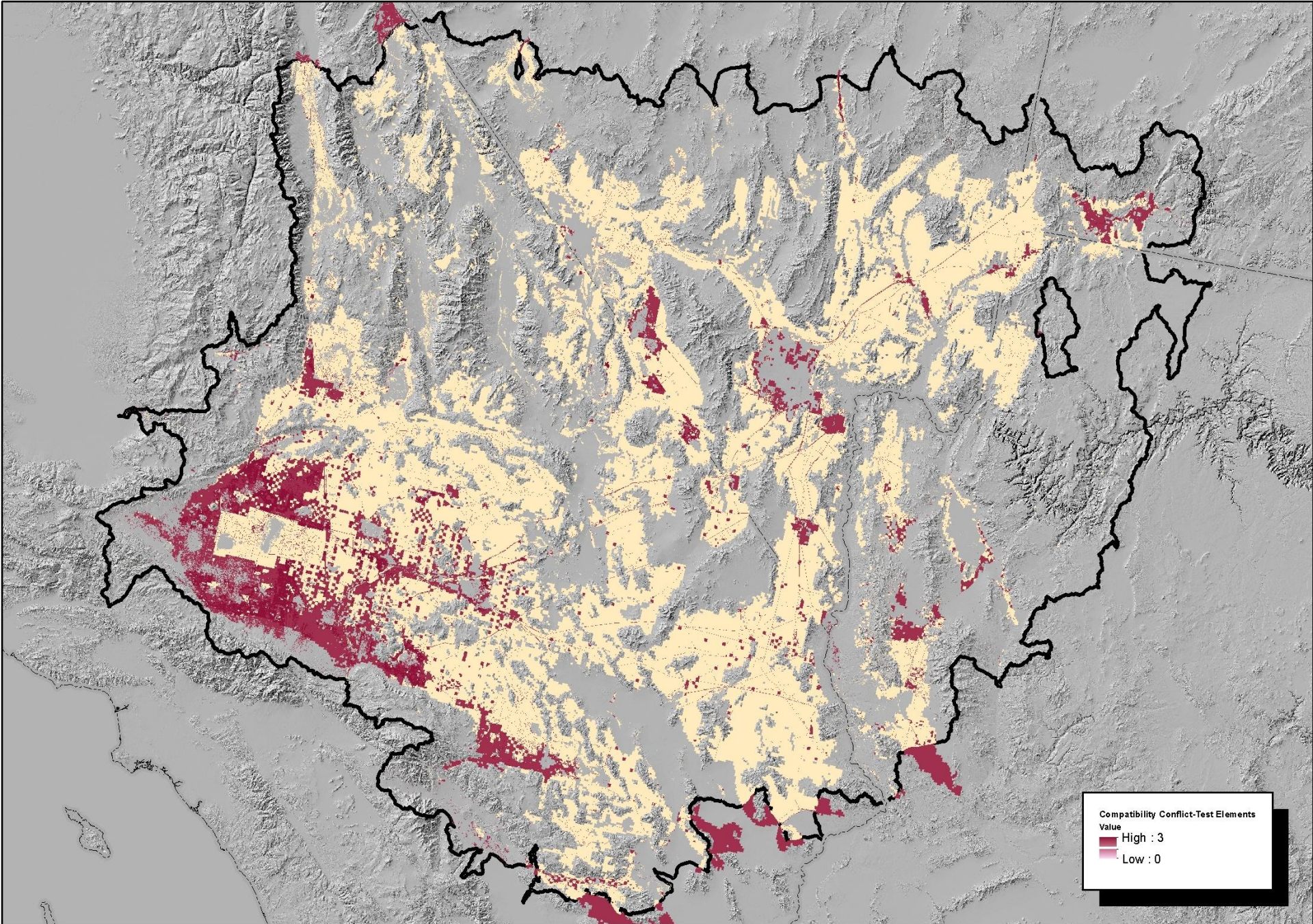
slot canyons,
ches

ines, ruins

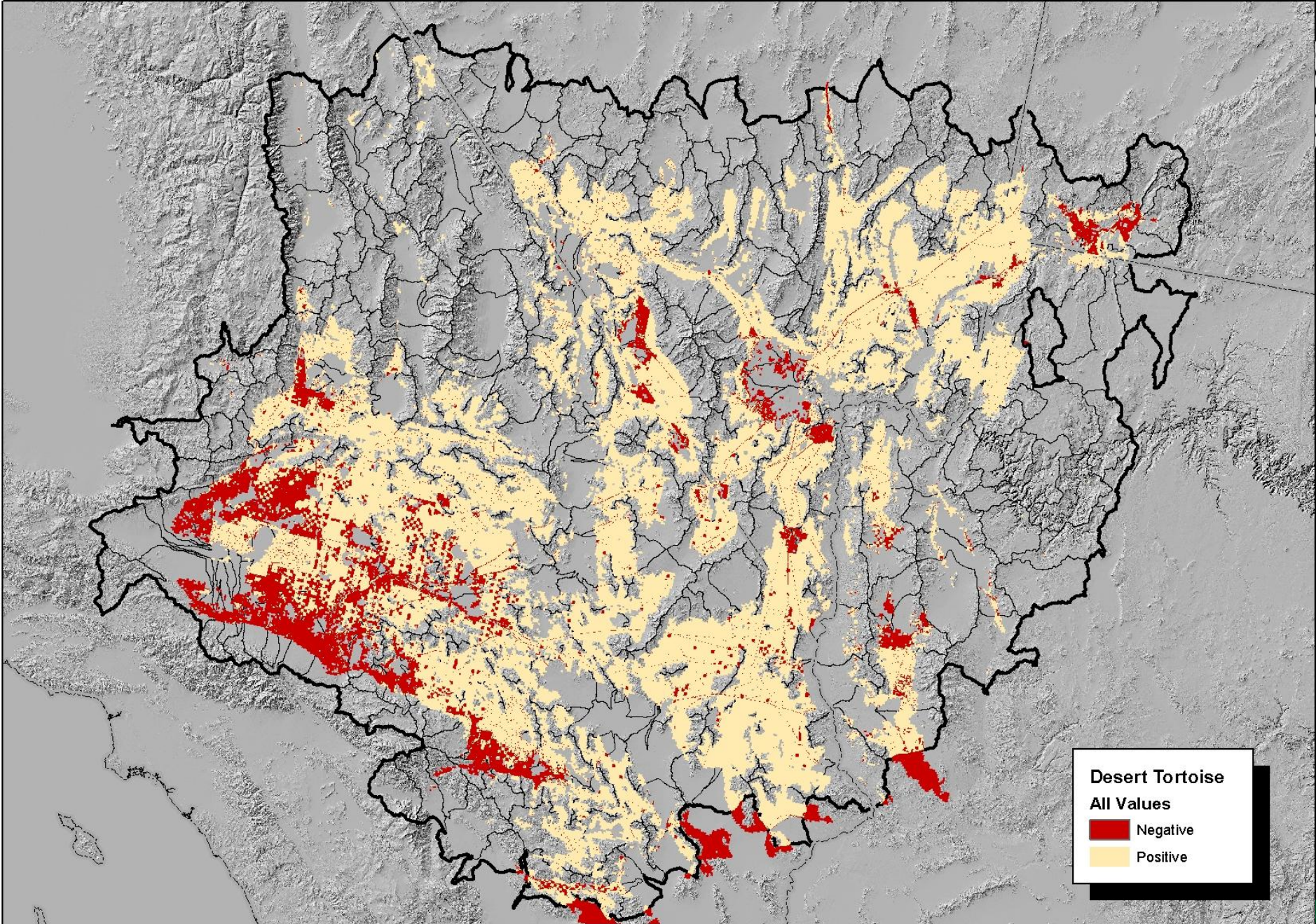
Assessments

- Where do locations of current CEs overlap with development Cas?

| | | | | | |
|---|-----------------------|--------|---------------|--------|--------------------|
| Name | Conservation Elements | | | | |
| Scenario | Current MBR | | | | |
| Cell size | 0.22 acres | | | | |
| | | | | | |
| Goal Performance by Element | | | | | |
| Name | Area (acres) | Occs | Area (acres) | Occs | Percent Compatible |
| Sonoran Mojave Salt Desert Scrub | 2,250,909.32 | 406642 | 1,472,473.86 | 300079 | 65.42% |
| North American Warm Desert Riparian Shrub | 107,201.38 | 22926 | 81,664.44 | 17616 | 76.18% |
| Desert Tortoise | 13,681,304.78 | 667 | 10,996,615.52 | 649 | 80.38% |



0 30 60 120 Miles



0 30 60 120 Miles

Assessments

■ Reporting Units: HUCs, HMAs, Allotments

Table Of Contents

- MBR_Assessment
 - Elements
 - Desert Tortoise
 - North American Warm Desert Riparian Shrub
 - Sonoran Mojave Salt Desert Scrub
 - Scenarios
 - Current MBR
 - Current MBR v2
 - Land Use
 - LandUse-1_Current MBR v2
 - Evaluations
 - Test Elements
 - Compatibility Conflict
 - Elements

Site Explorer

Test Elements

Scenario Evaluation

Site Layer PLIV_MBR_huc10_watersheds

Selection Attributes

FID: 156

FID: 157

FID: 158

| Element Name | Total |
|---|-------------------------------|
| Sonoran Mojave Salt Desert Scrub | 406,642 occ's.; 2,250,909.32 |
| North American Warm Desert Riparian Shrub | 22,926 occ's.; 107,201.38 ac. |
| Desert Tortoise | 667 occ's.; 13,681,304.78 ac. |

Site Selection Report

Back Forward Stop Refresh Print Export Show XML Customize

Site Selection Report

Based on Scenario Evaluation [Test Elements](#)

- [Element Inventory - Summary](#)
- [Element Inventory - Detail](#)
 - [Sonoran Mojave Salt Desert Scrub](#)
 - [North American Warm Desert Riparian Shrub](#)
 - [Desert Tortoise](#)
- [Scenario Inventory](#)
 - [By Source Layer](#)
 - [By Land Use and Policy Type](#)
 - [By Land Use with Element Response](#)
- [Selected Sites Listing](#)

Element Inventory - Summary

| Element | Total | Selection | Compatible Area | % Compat | Selection Compat | Response |
|---|----------------------------------|-------------------------------|-----------------|--------------------------|------------------------------|----------|
| Sonoran Mojave Salt Desert Scrub | 406,642 occ's.; 2,250,909.32 ac. | 54,924 occ's.; 443,607.78 ac. | | 73.8% occ's.; 65.4% area | 29,224 occ's.; 225,234.9 ac. | (None) |
| North American Warm Desert Riparian Shrub | 22,926 occ's.; 107,201.38 ac. | 401 occ's.; 1,442.76 ac. | | 76.8% occ's.; 76.2% area | 191 occ's.; 335.28 ac. | (None) |
| Desert Tortoise | 667 occ's.; 13,681,304.78 ac. | 5 occ's.; 929,887.86 ac. | | 97.3% occ's.; 80.4% area | 3 occ's.; 506,974.16 ac. | (None) |

[Back to top](#)

Scenario Detail

By Source Layer

[Back to top](#)

By Land Use and Policy Type

[Back to top](#)

By Land Use and Element Response

[Back to top](#)

Element Inventory - Detail

Sonoran Mojave Salt Desert Scrub

| Element | Sonoran Mojave Salt Desert Scrub |
|--------------|--|
| Total | 406,642 occ's.; 2,250,909.32 ac. |

Done

Clarifications

- MQ #52 Where are ecological areas with significant recreational use?
 - A reporting unit question: what is the proportion of high biodiversity sites with recreation use?
 - A CE question: what CEs and their proportions are overlapped by recreation?
 - An EI question: what areas of high ecological integrity are overlapped by recreation?
 - Or like this one: Where are the areas of CEs that fall below their EI threshold due to development [recreation] CAs?

Options for reporting units relevant to basic MQs (where are CEs/CAs/Places and their overlaps?)



Reporting Units

MQs:

Where are CEs?

Where are CAs?

Where do CAs affect CEs?

Where might CAs affect CEs in 2025?

Where might CEs occur in 2060?

Where might CAs occur in 2060?



Reporting Units

- **5th level watersheds**
- **other forms of ‘gap analysis’**
- **Places: High Biodiversity areas**
- **Places: Herd Management units**
- **Others?**

Lunch break on your own



Assessing current ecological status & integrity of [upland] CEs

Management Questions

- What is the natural range of variation in ecological processes affecting this CE?
- Where are the highest-integrity examples of each CE?
- Where are areas with high potential for fire...or invasives...etc.?

Assessing Ecological Status/Integrity

- Inform BLM Ecoregion Direction
- Provide a consistent process to focus resource assessment
 - Based on best available science
- Highlight conditions requiring management attention
- Identify remotely sensed indicators for management and monitoring



CEs & Status

- CE Class I – Terrestrial Coarse Filter
- CE Class II – Terrestrial Fine Filter
- CE Class IV - Aquatic Coarse Filter

CE Conceptual Model Format (handout)

Key Features

- Overview of CE (& distribution maps)
- Summary of natural dynamics & stressors
- Key Ecological Attributes & Indicators within Scorecard





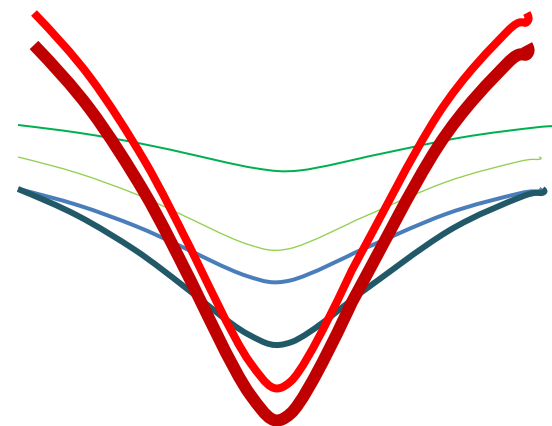
CE Status Scorecard

| Indicator | Justification | Rating | | | Index Score |
|---|---|---|---|---|-------------|
| | | Sustainable | Transitioning | Degraded | |
| Rank Factor: LANDSCAPE CONTEXT | | | | | |
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| Rank Factor: CONDITION | | | | | |
| Key Ecological Attribute: <i>Species Composition</i> | | | | | |
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| Overall Ecological Integrity Rank | | | | | |
| Mean Index Score | | | | | 0.0 – 1.0 |

CBR/MBR Landscape Condition

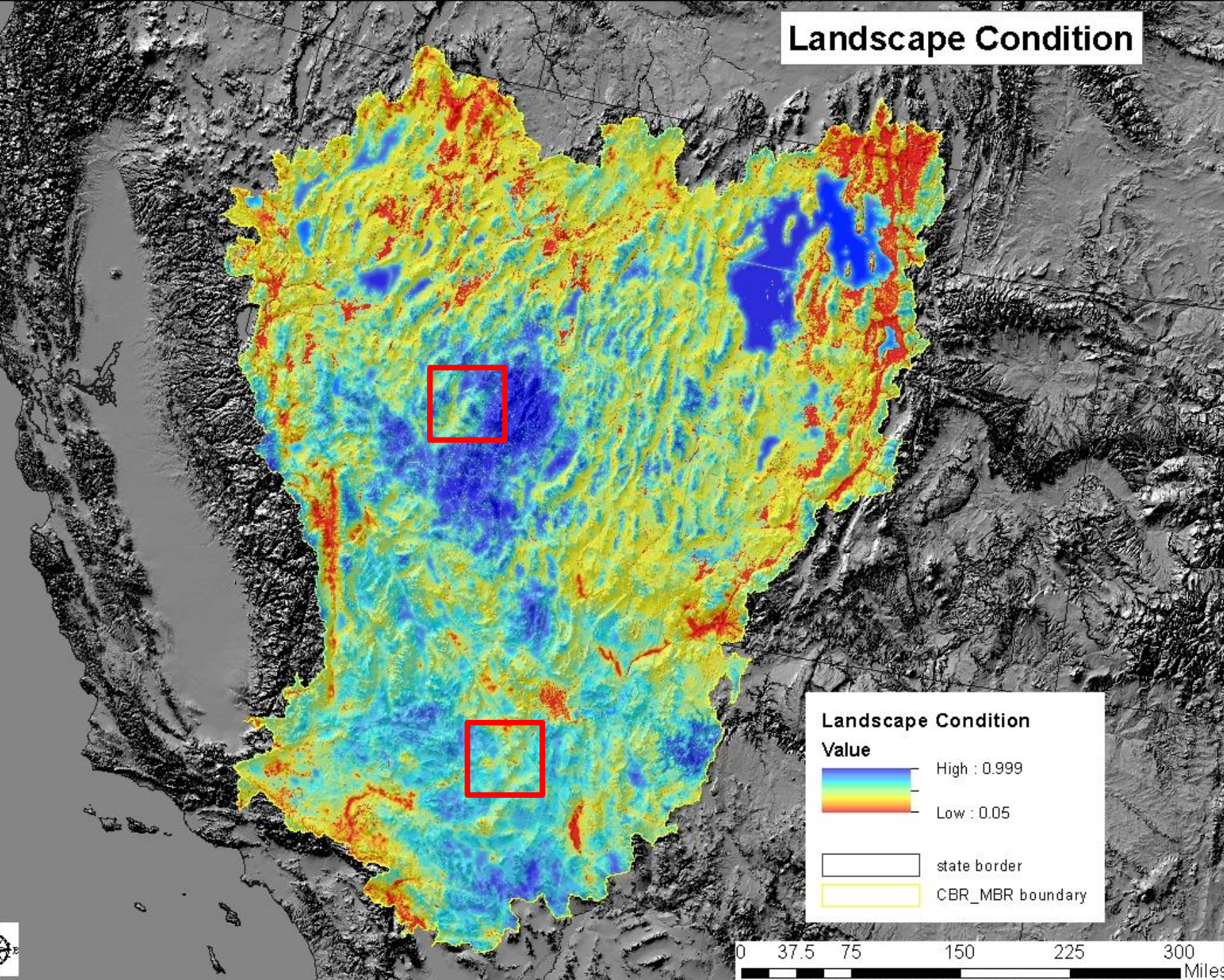
| Land use | Point of Impact | Distance Decay |
|--|-----------------|----------------|
| Recent logging | 0.9 | moderate |
| Pasture & Hay | 0.9 | abrupt |
| Invasive Annual/Perennial Vulnerability (low) | 0.8 | mod |
| 2 track & dirt road | 0.7 | mod |
| Invasive Annual/Perennial Vulnerability (mod) | 0.7 | mod |
| Low intensity development | 0.6 | mod |
| Invasive Annual/Perennial Vulnerability (high) | 0.6 | mod |
| Local Road | 0.5 | mod |
| Agriculture | 0.3 | mod |
| Secondary & Connecting Road | 0.2 | gradual |
| Primary Highway | 0.05 | gradual |
| High intensity development | 0.05 | very gradual |

Combined Surface

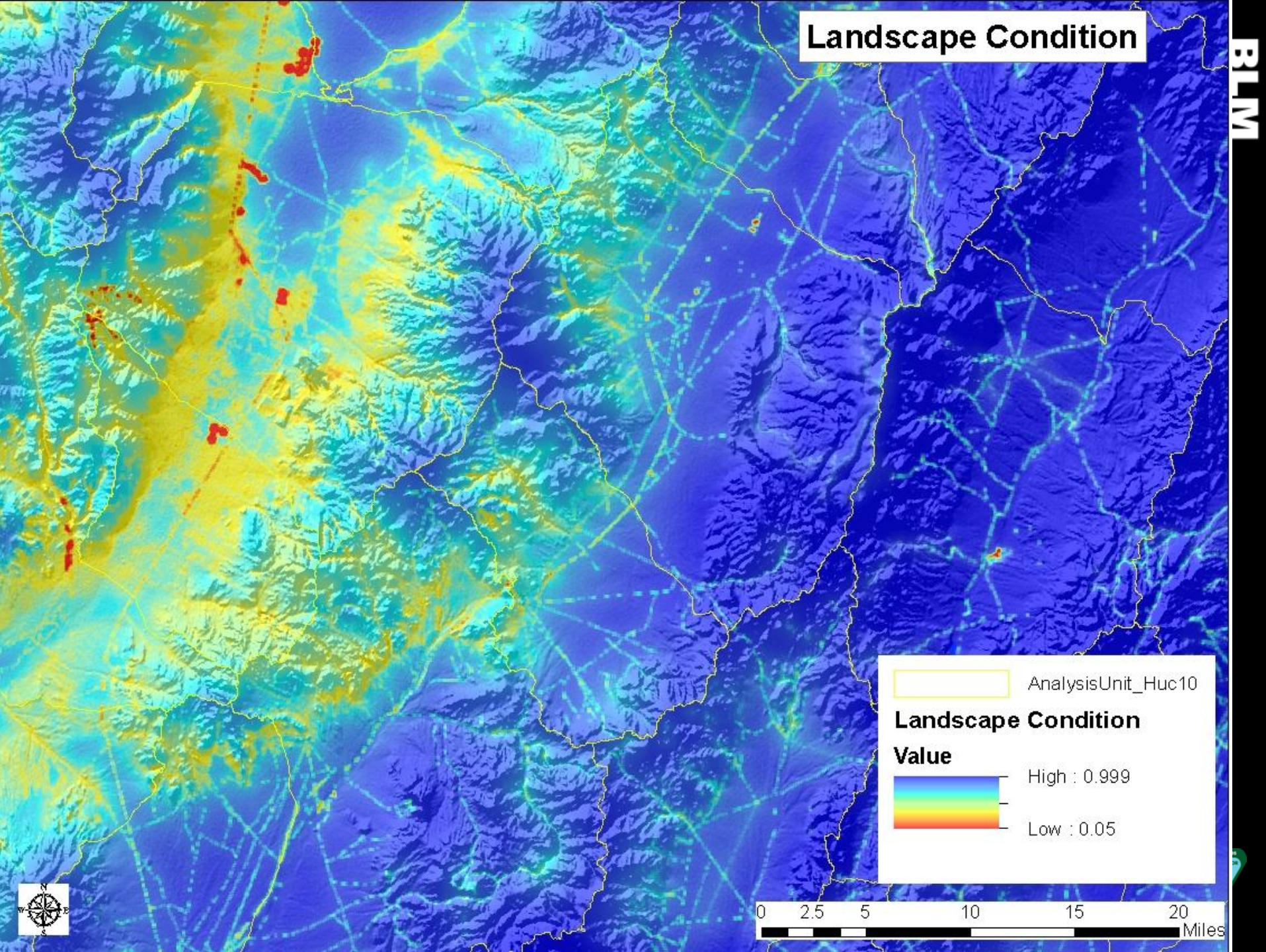


Each pixel gets a value

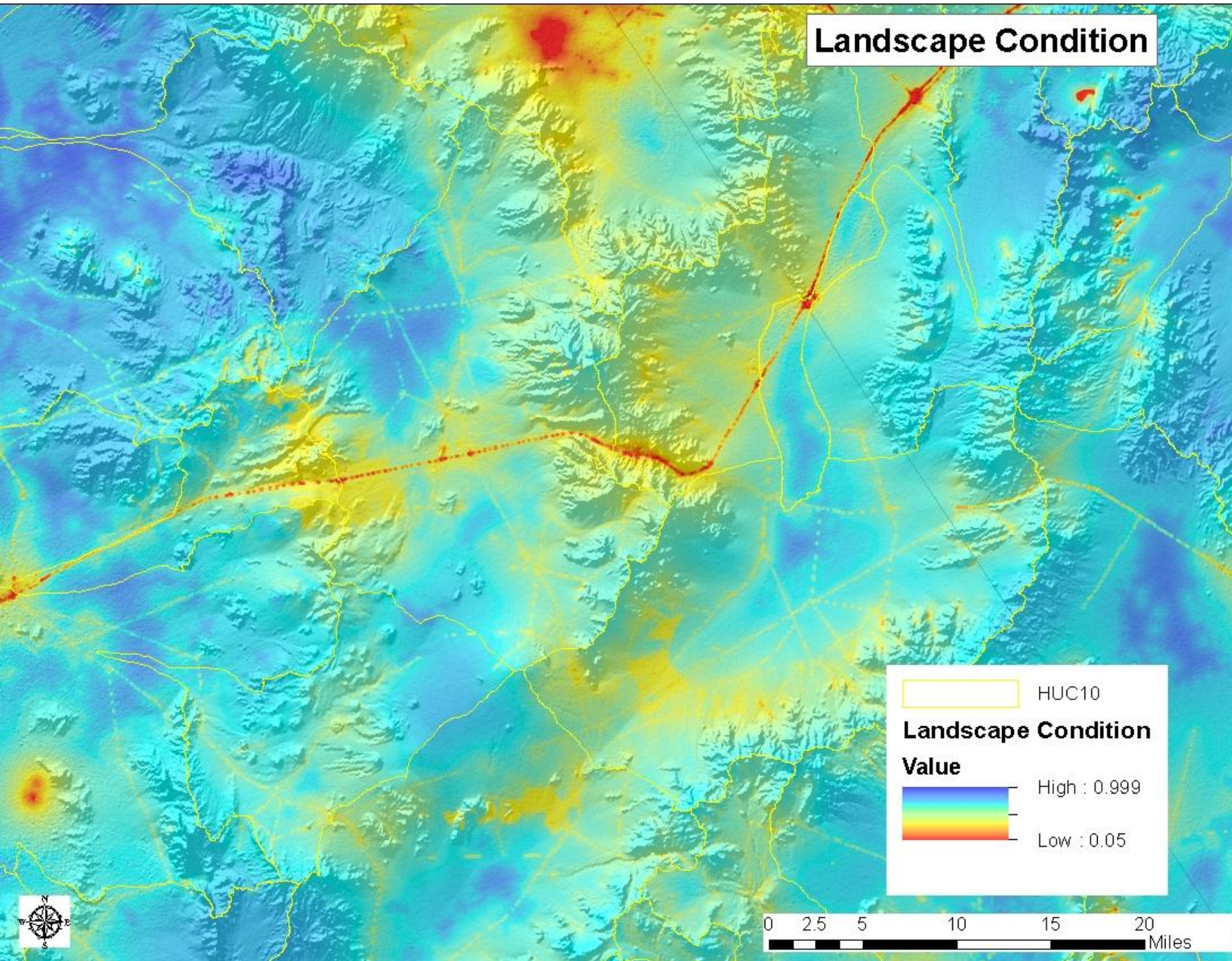
Landscape Condition



Landscape Condition



Landscape Condition



Landscape Condition

LCM without invasives vulnerability

Value

High : 0.99



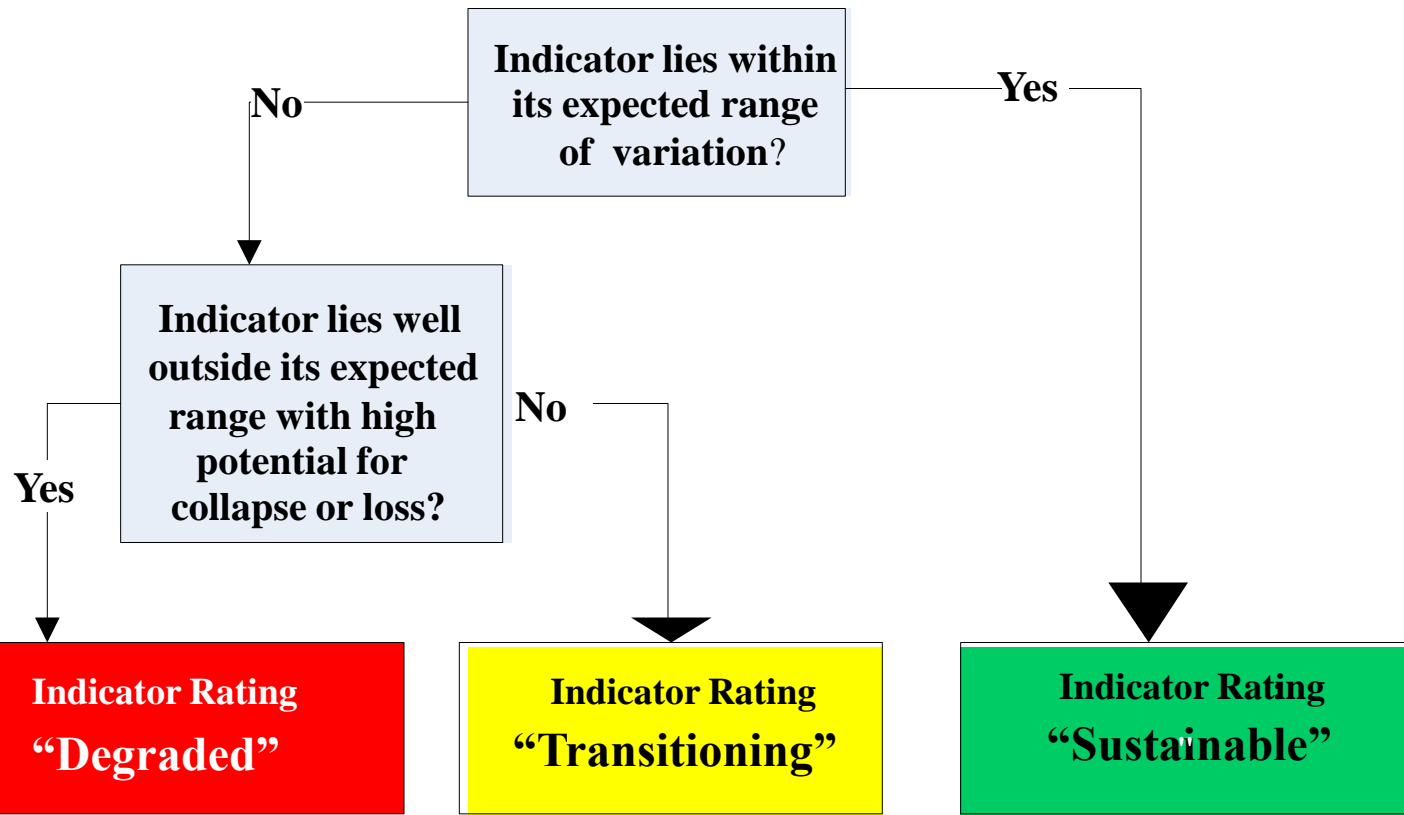
Low : 0.05

0 30 60 120 180 240 Miles



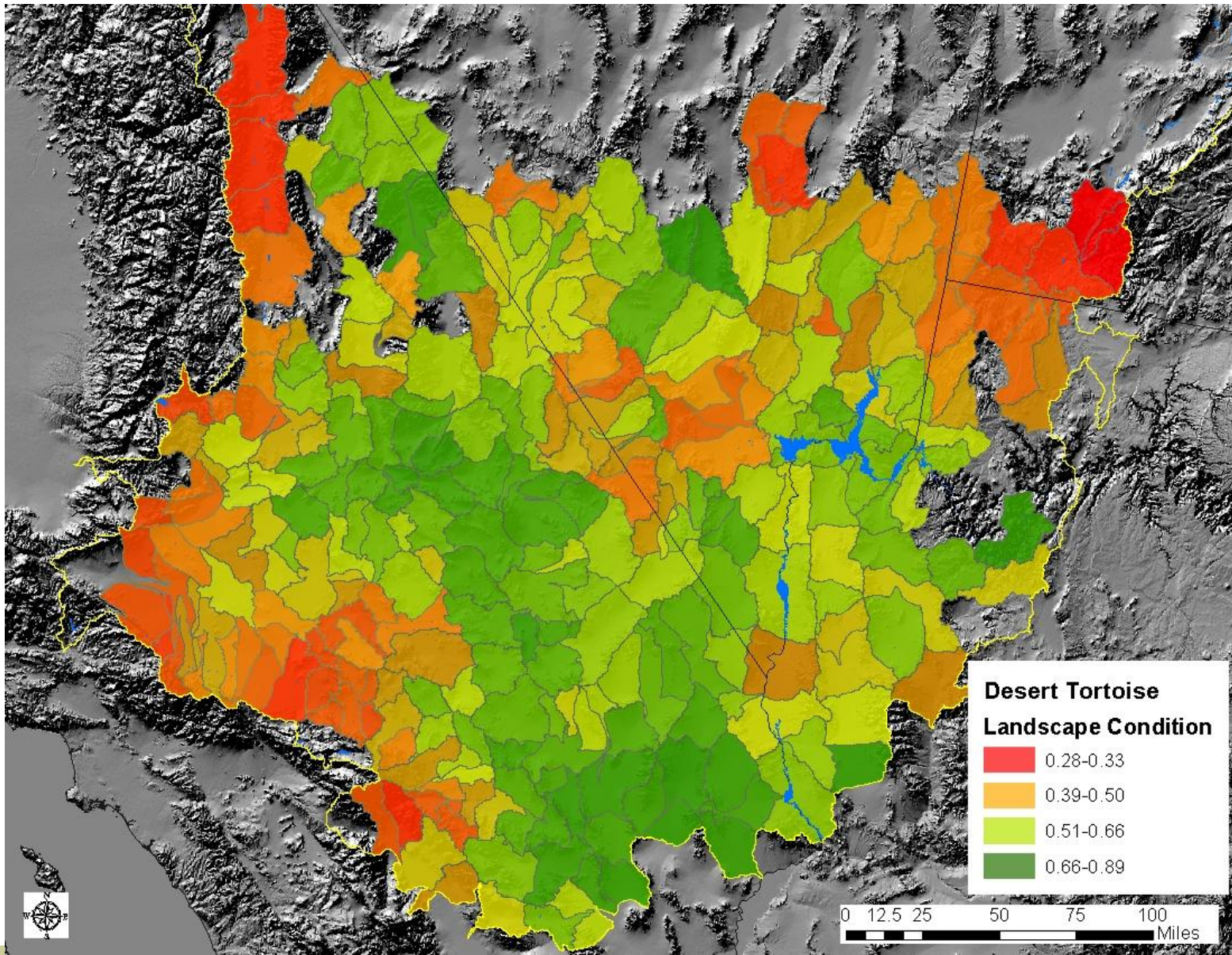
Rating Indicator Status

Decision Tree for Rating Indicator Status

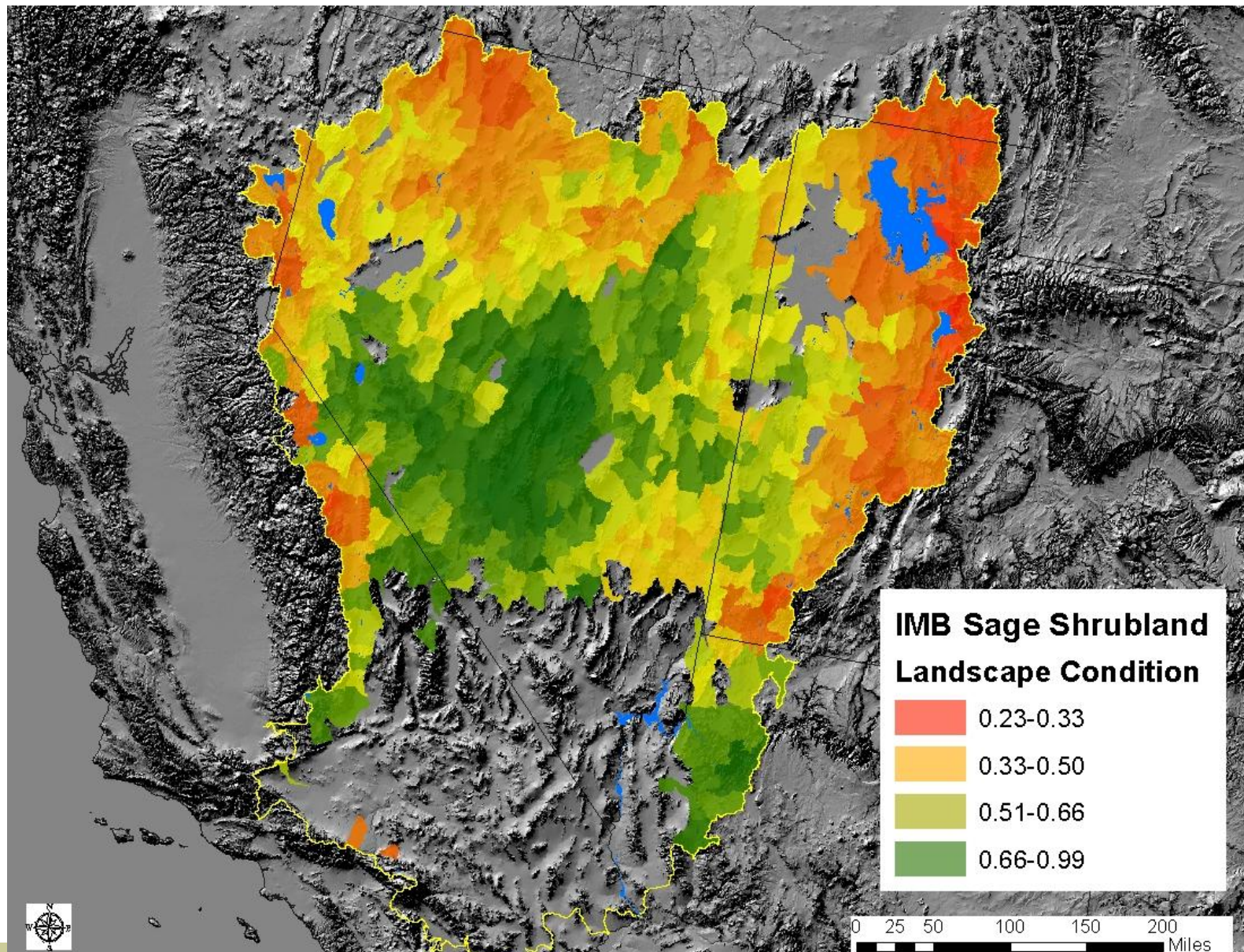


Or a 0.0 to 1.0 Range

Desert Tortoise – Condition Score



IMB Sage Shrubland – Condition Score

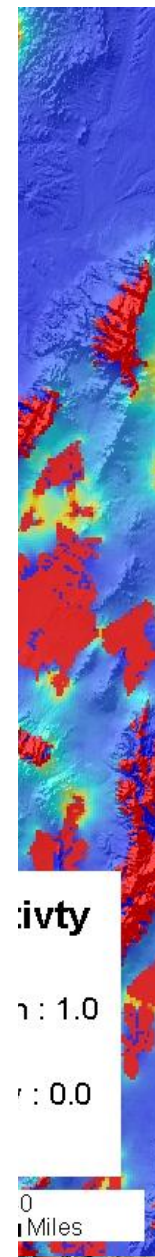
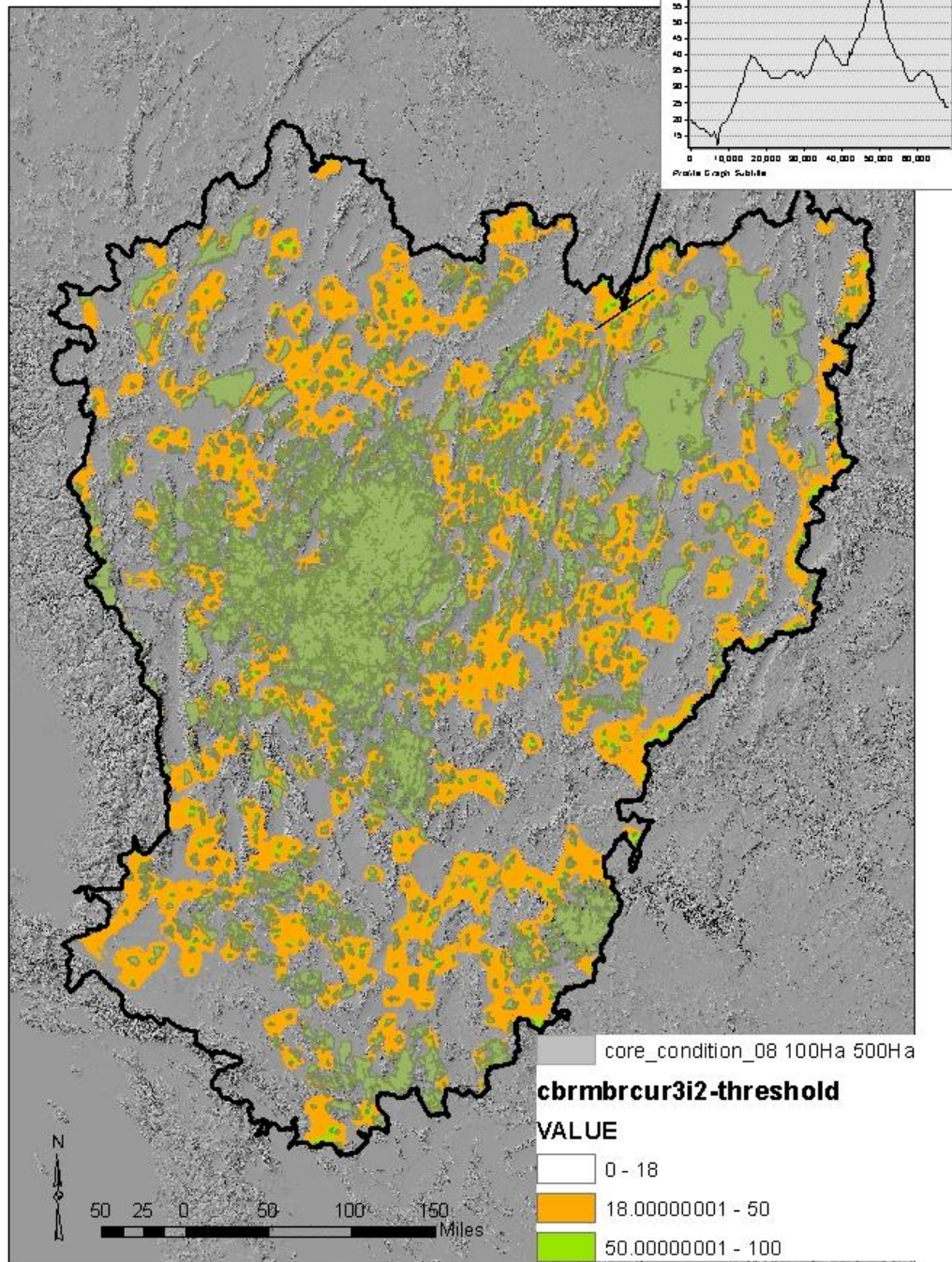
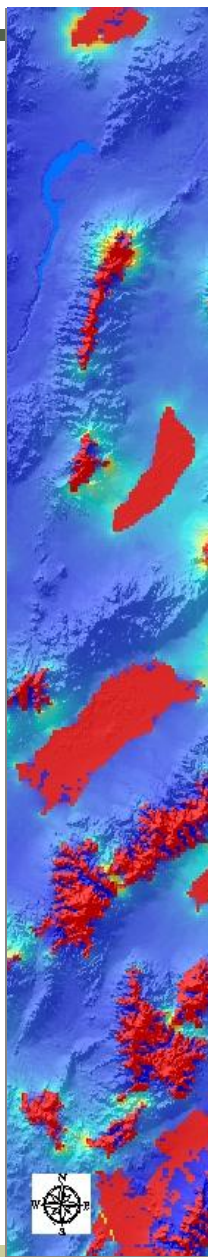




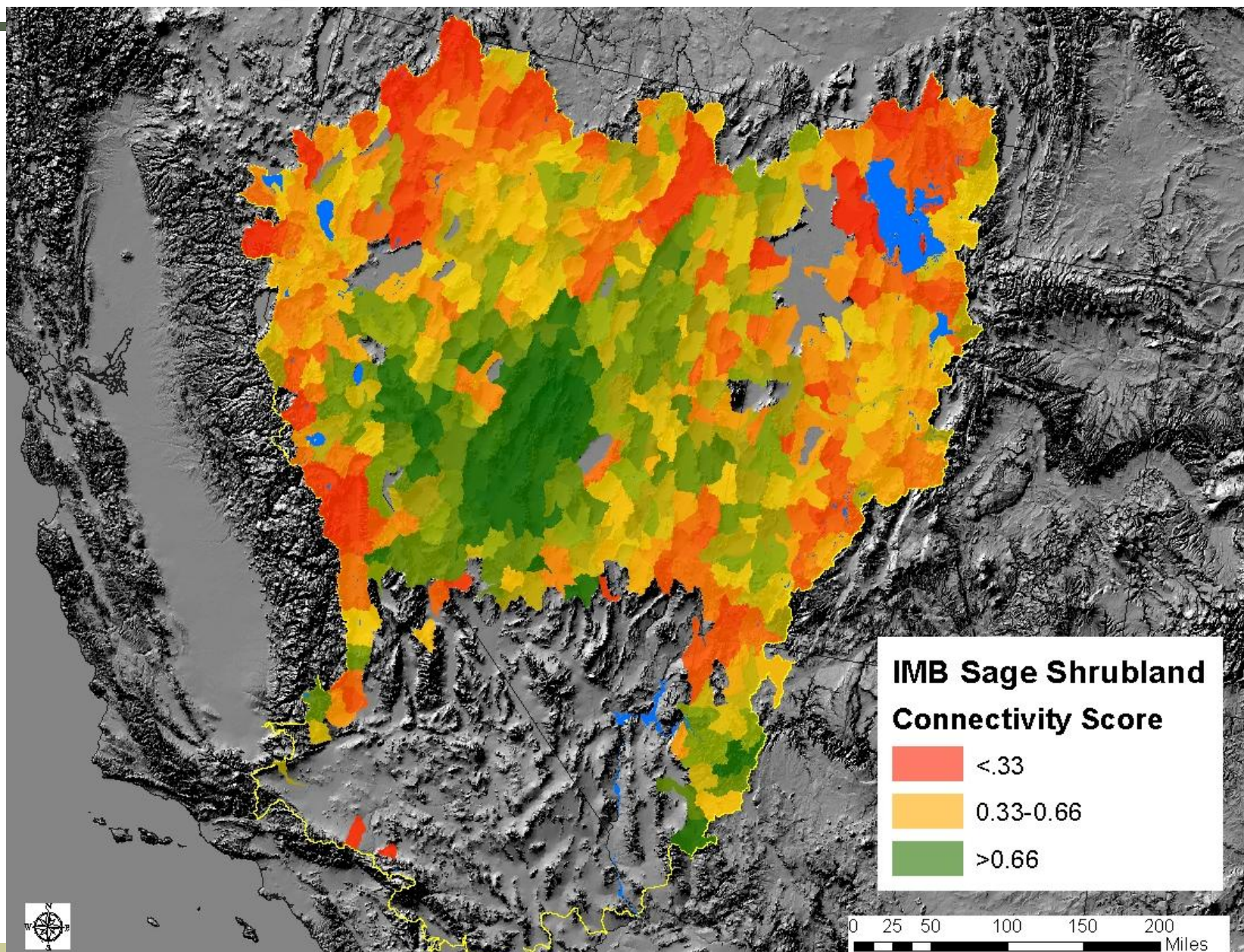
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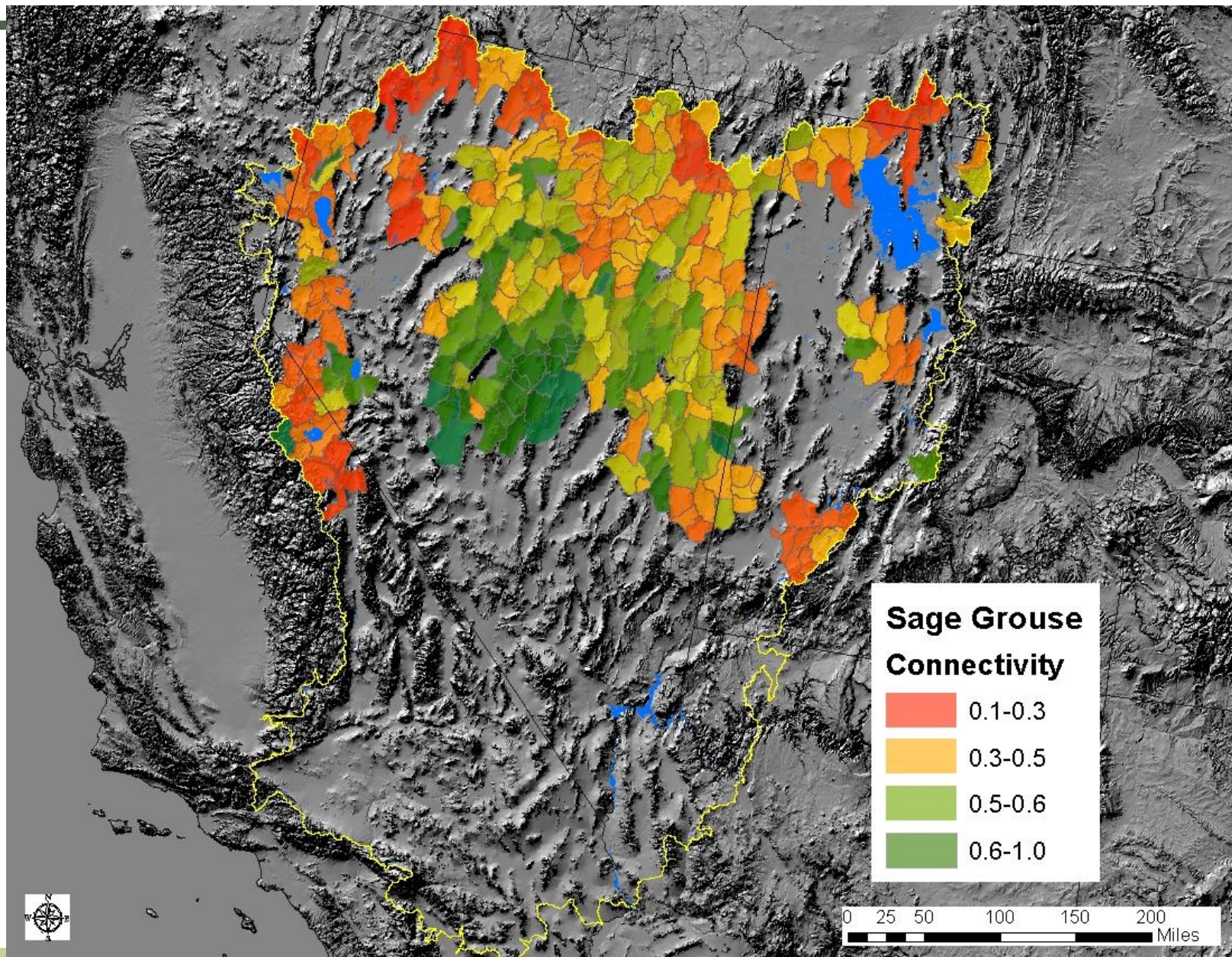
Land



IMB Sage Shrubland Connectivity



Greater Sage-Grouse Connectivity



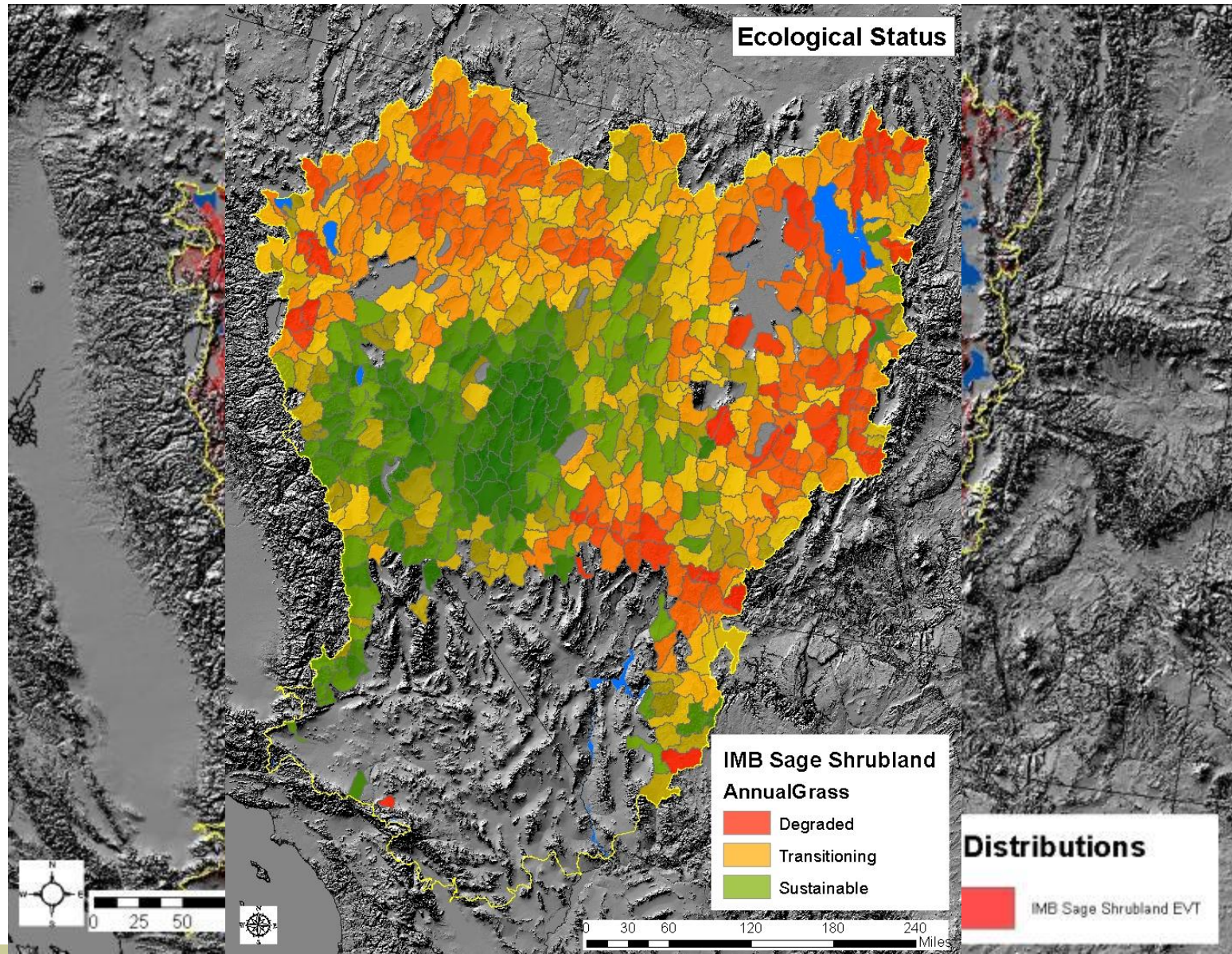
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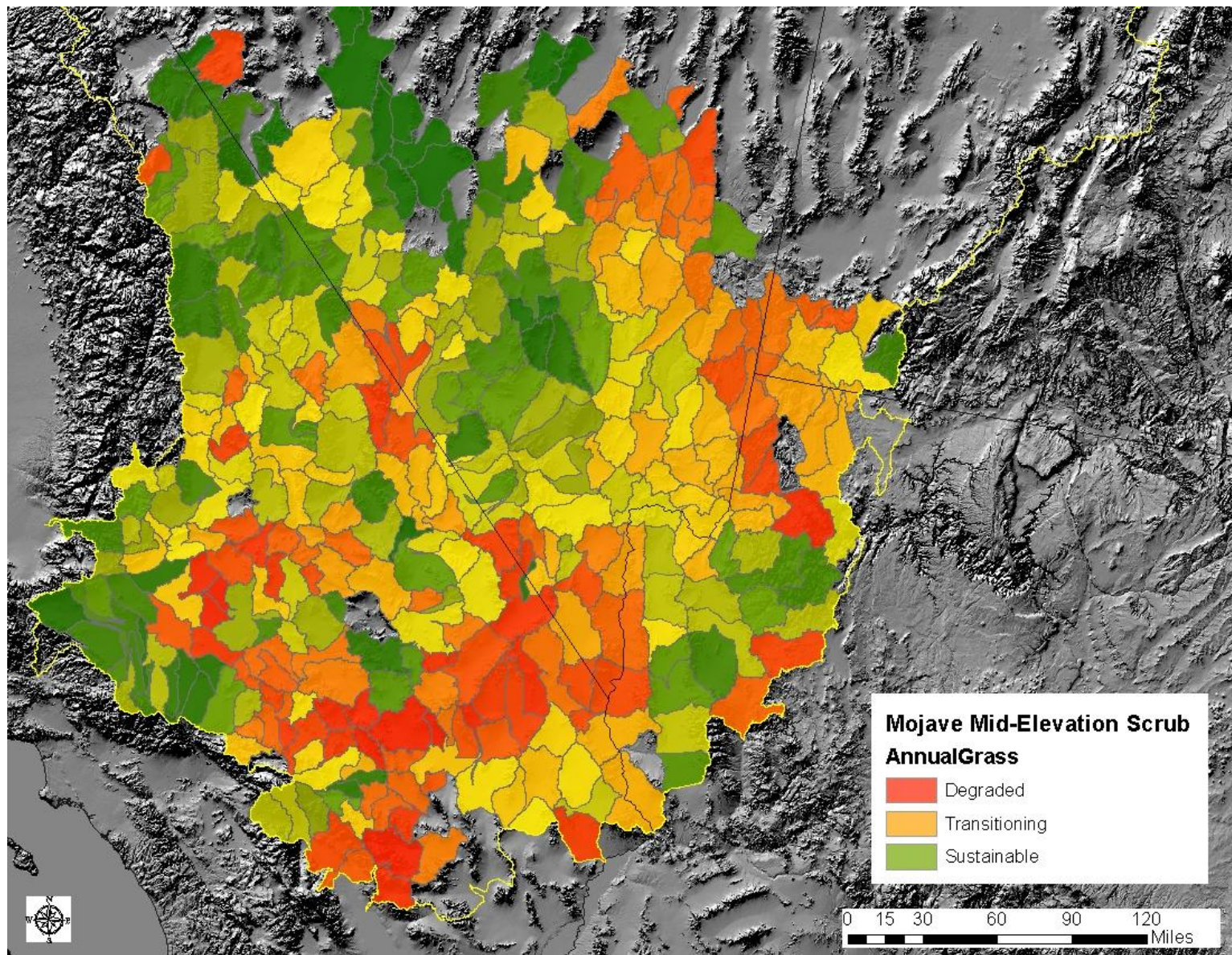
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Invasives Annual Grasses – IMB

Big Sagebrush Shrubland



Invasives Annuals – Mojave Mid-Elevation Desert Scrub

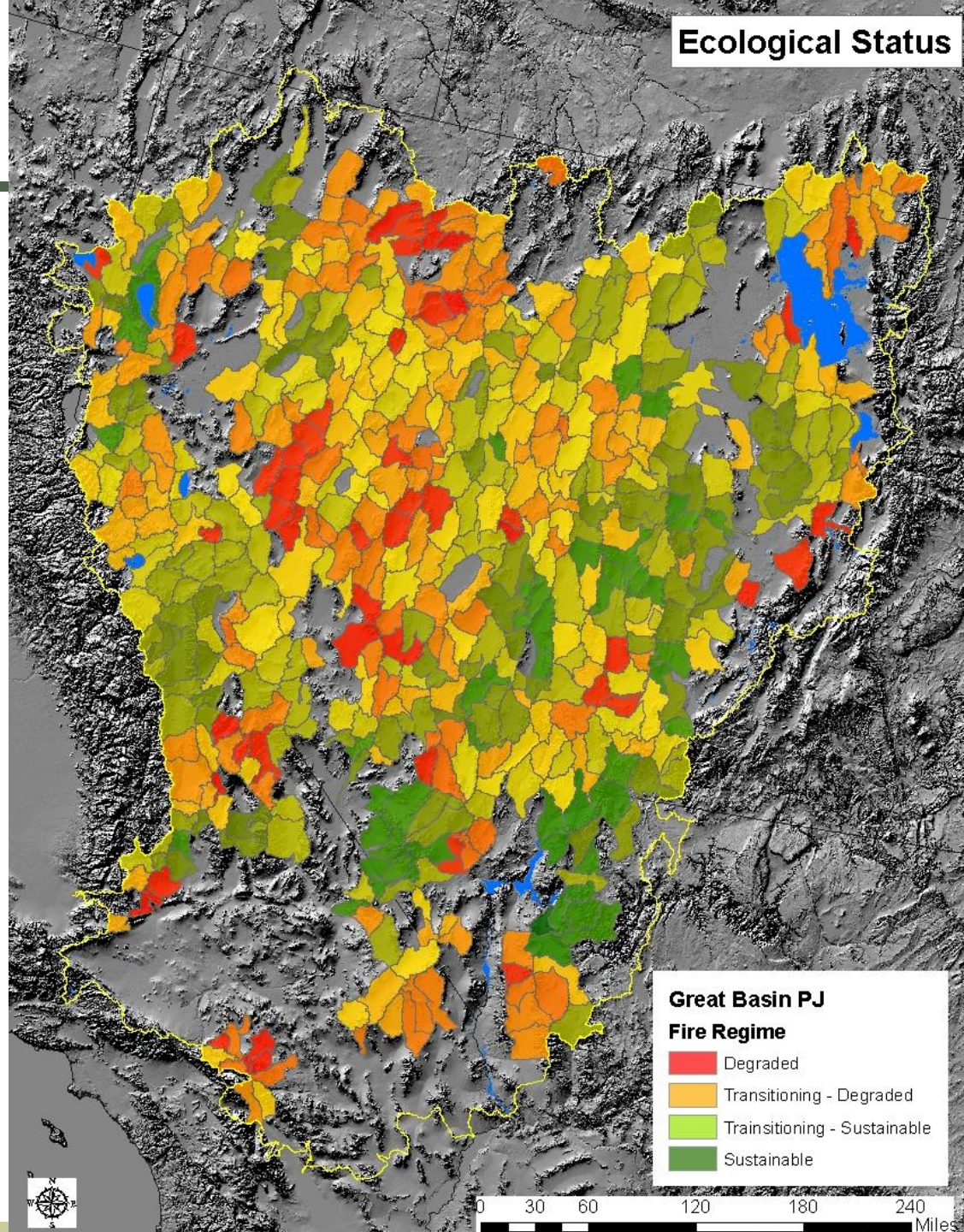


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Ecological Status



Overall Departure by Watershed

Proportional Areal Calculation

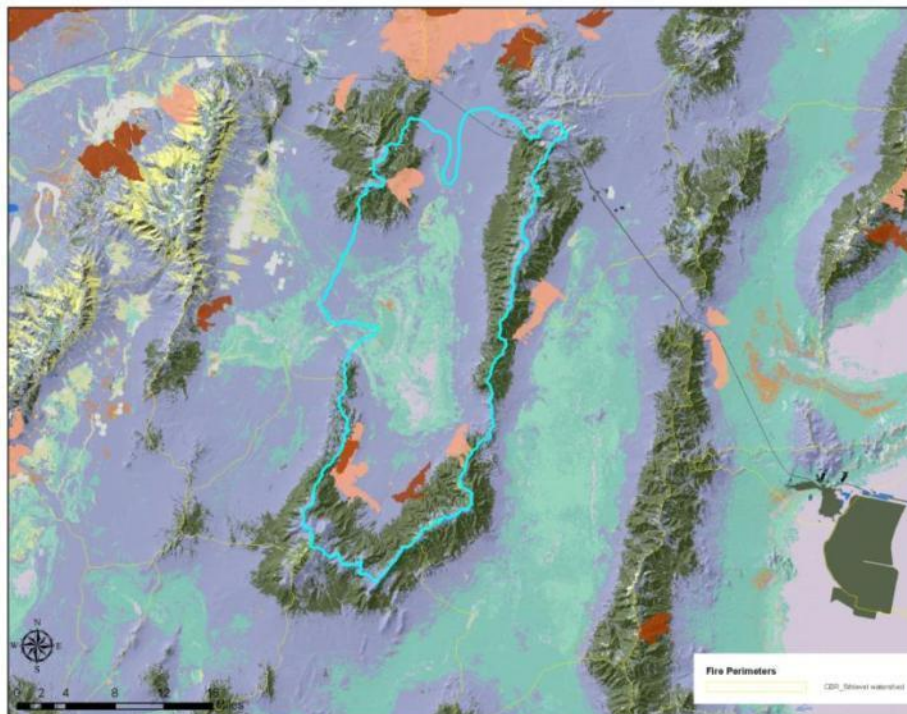
Pinyon-Juniper = 30%
63.2% departure

Salt Desert Scrub = 20%
8.2% departure

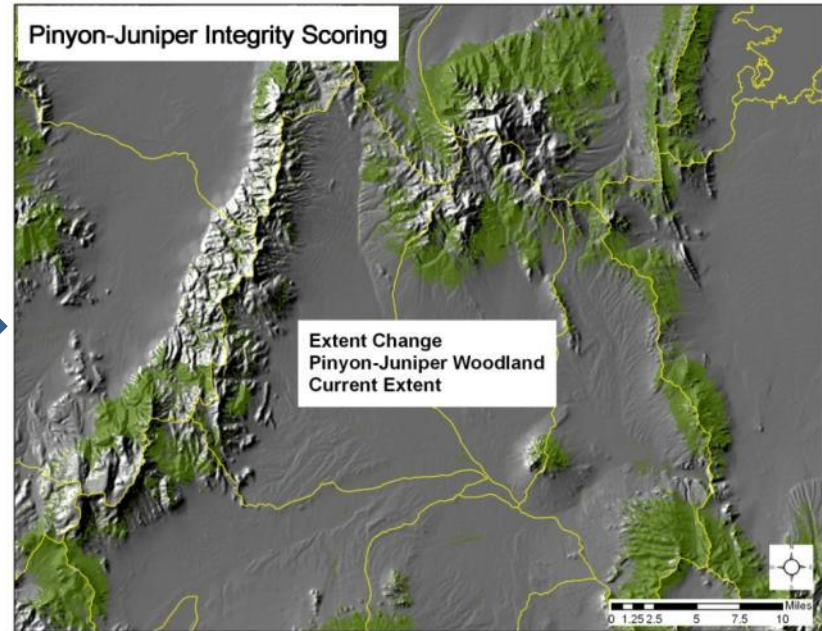
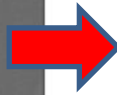
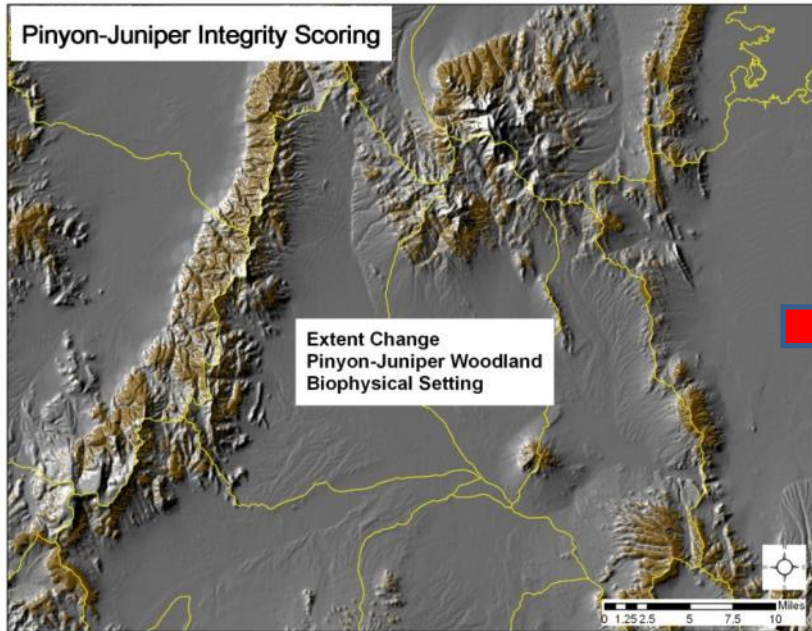
Sagebrush Shrub = 50%
80% departure

**Watershed Total = 60.6%
departure = 'transitioning'**

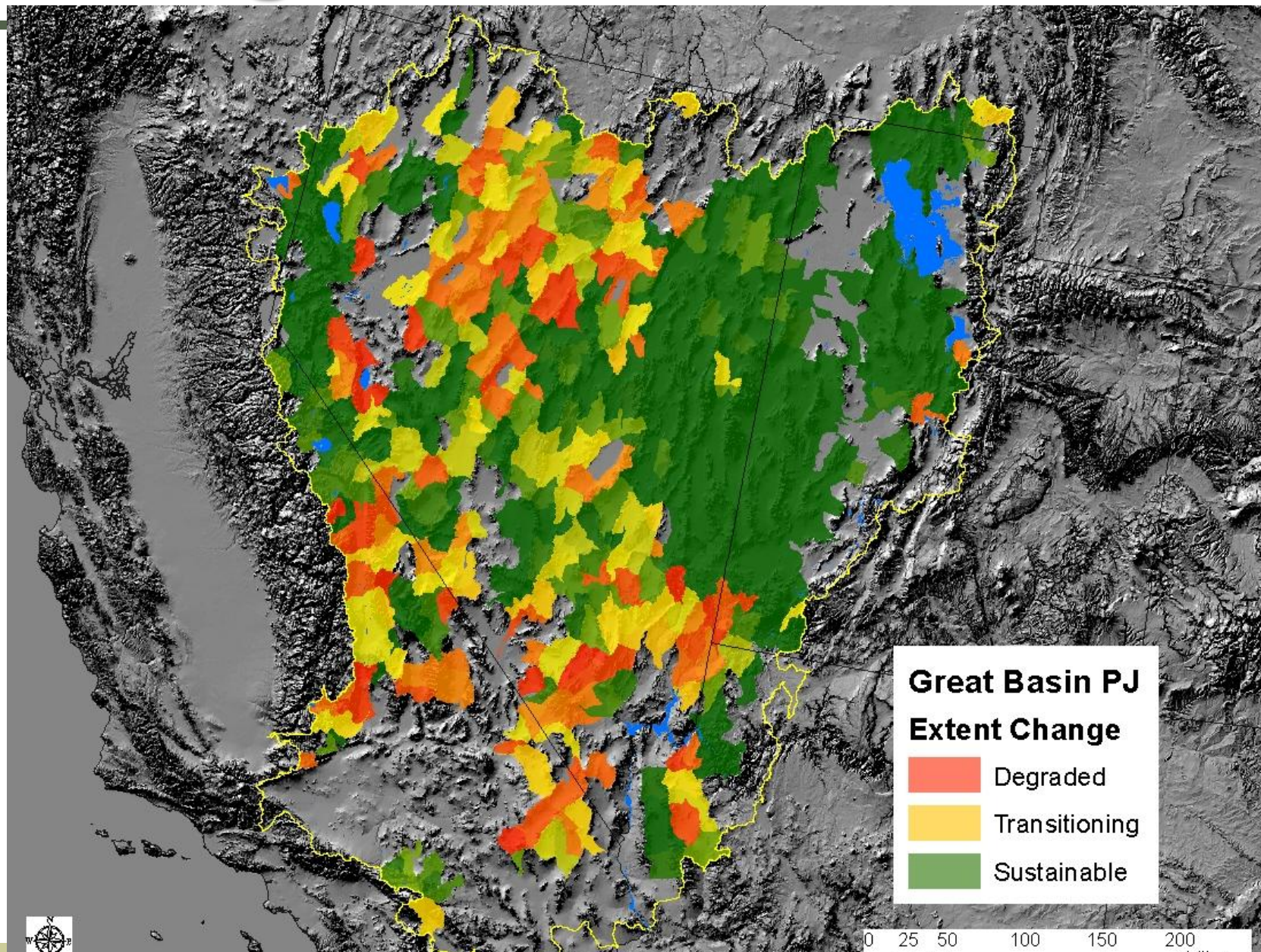
**(or 'transitioning-
sustainable')**



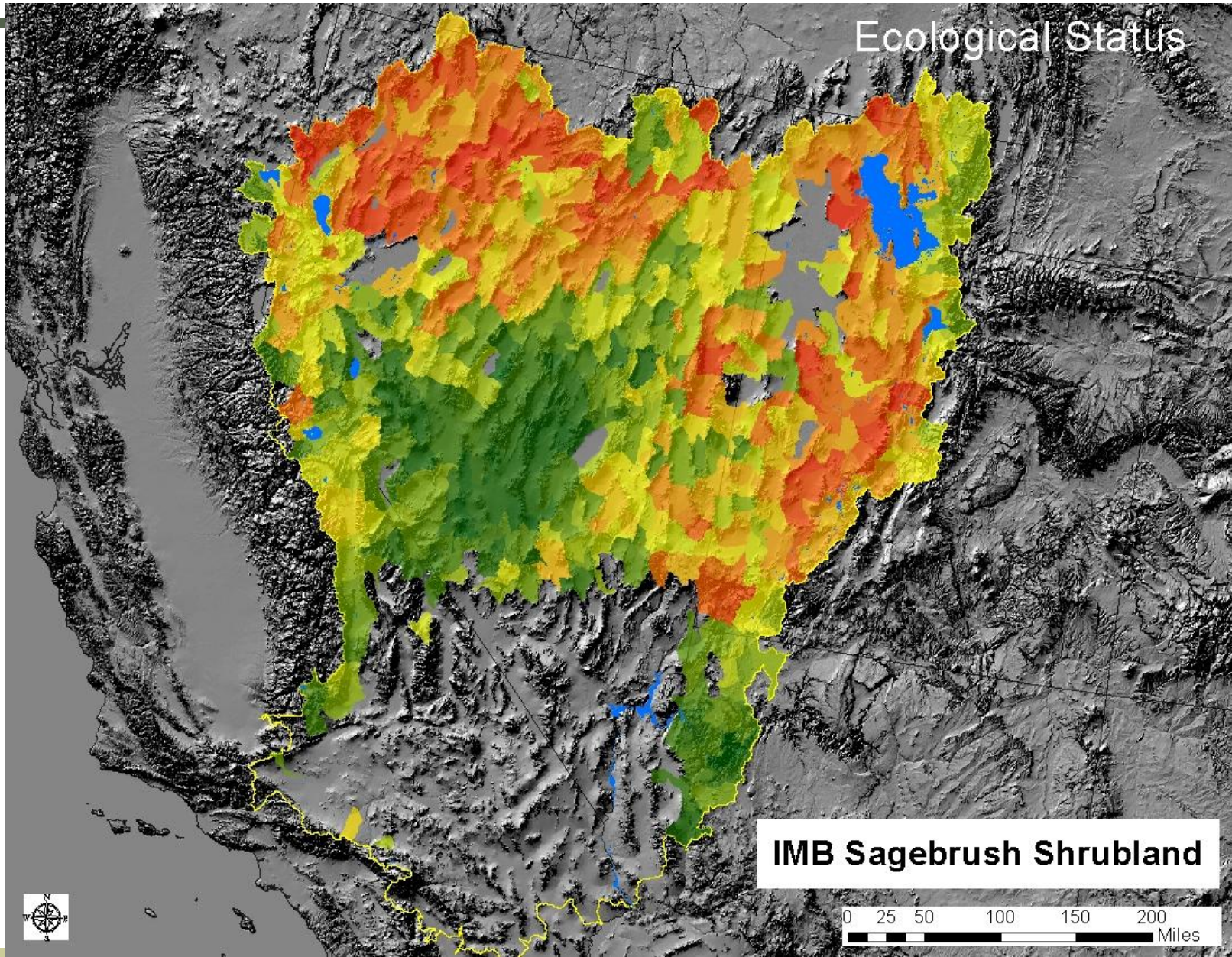
Change in Extent



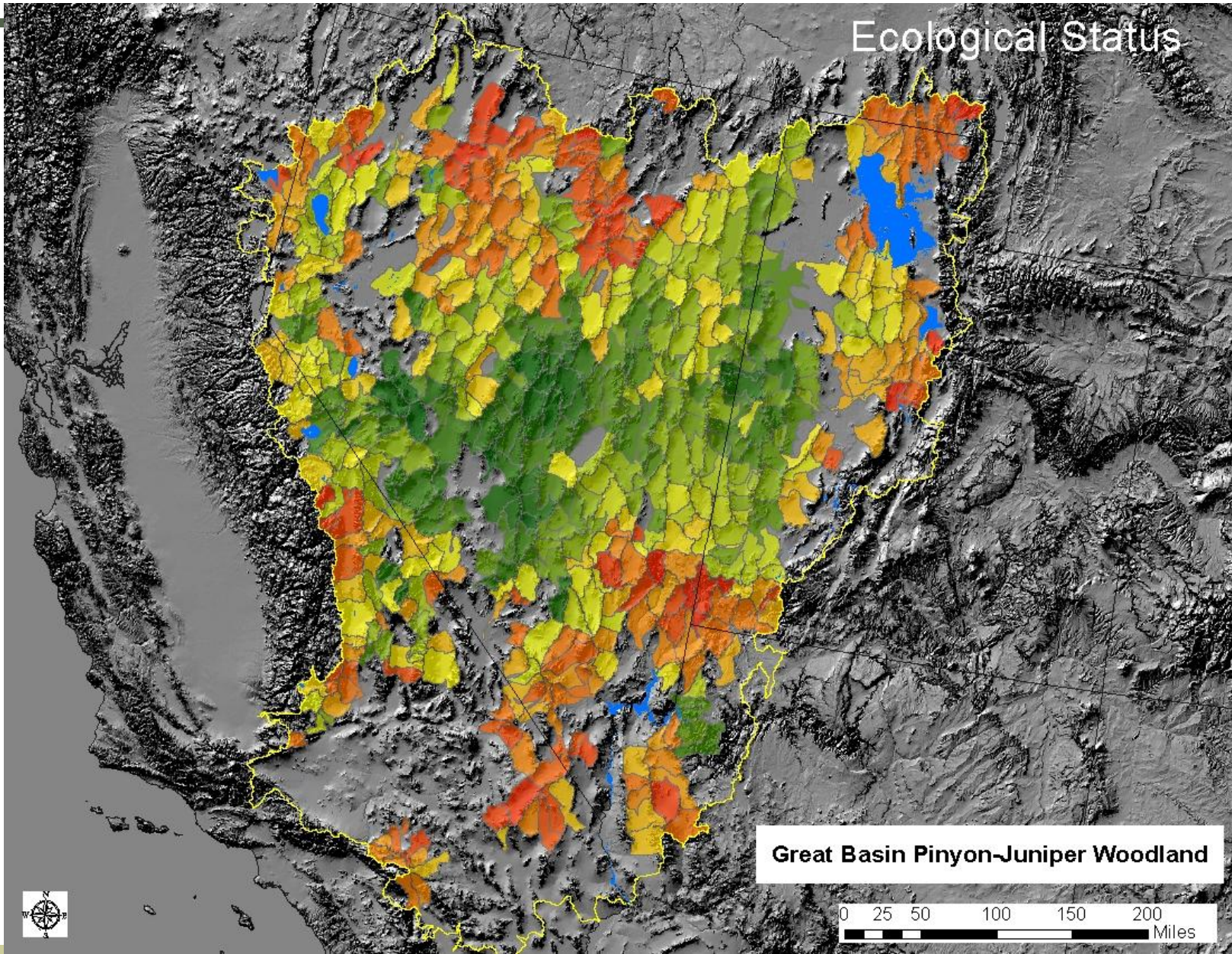
Change in Extent



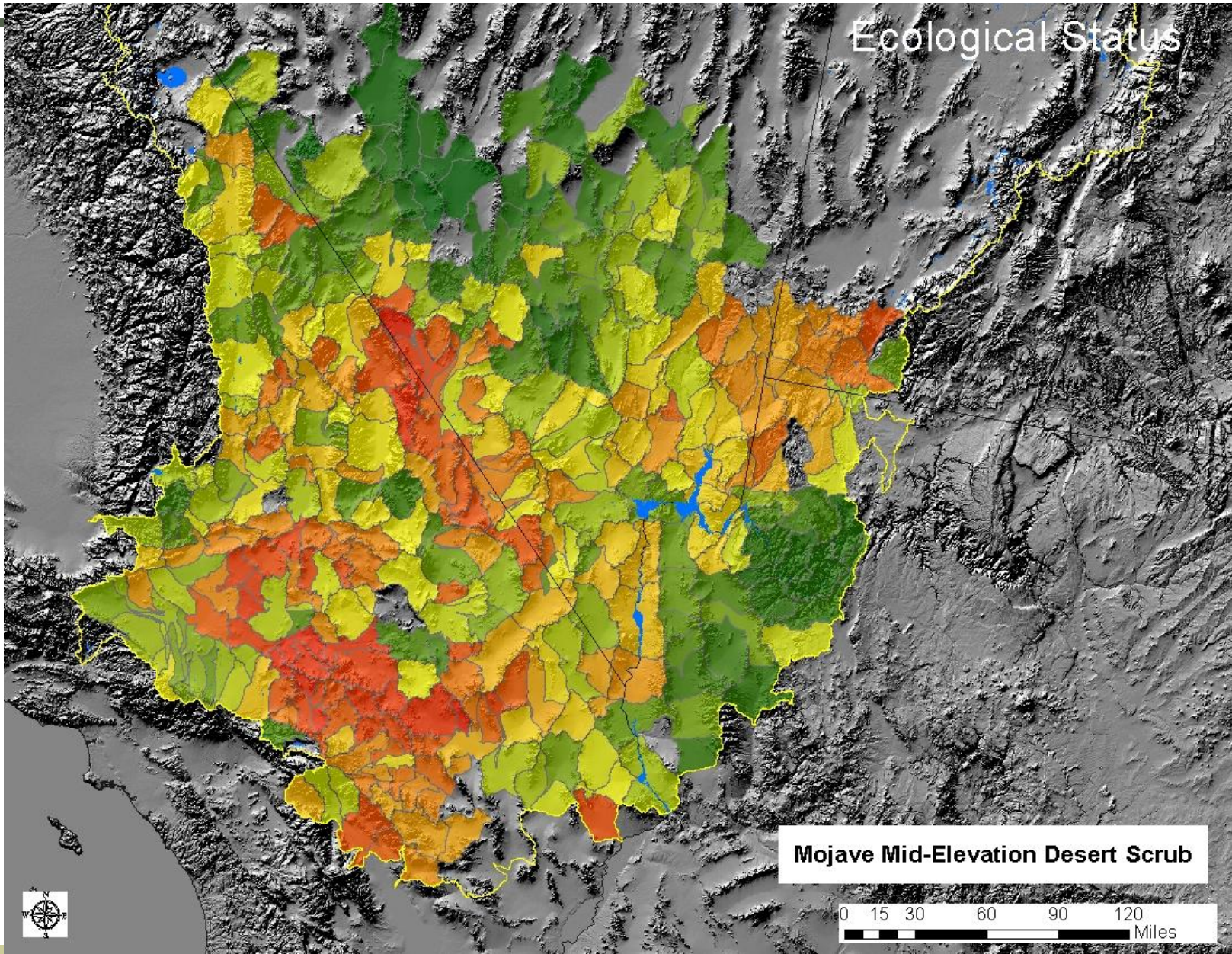
Ecological Status Score



Ecological Status Score



Ecological Status Score



Ecological Integrity Index by Watershed

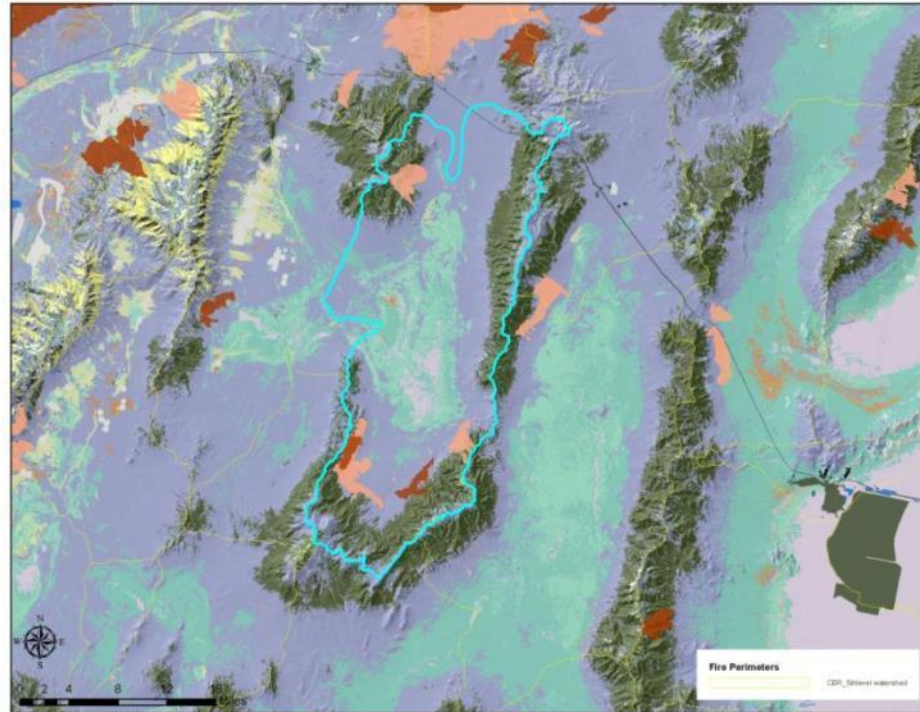
Proportional Areal Calculation

Pinyon-Juniper = 30% Status
Score = 0.6 = 6.0

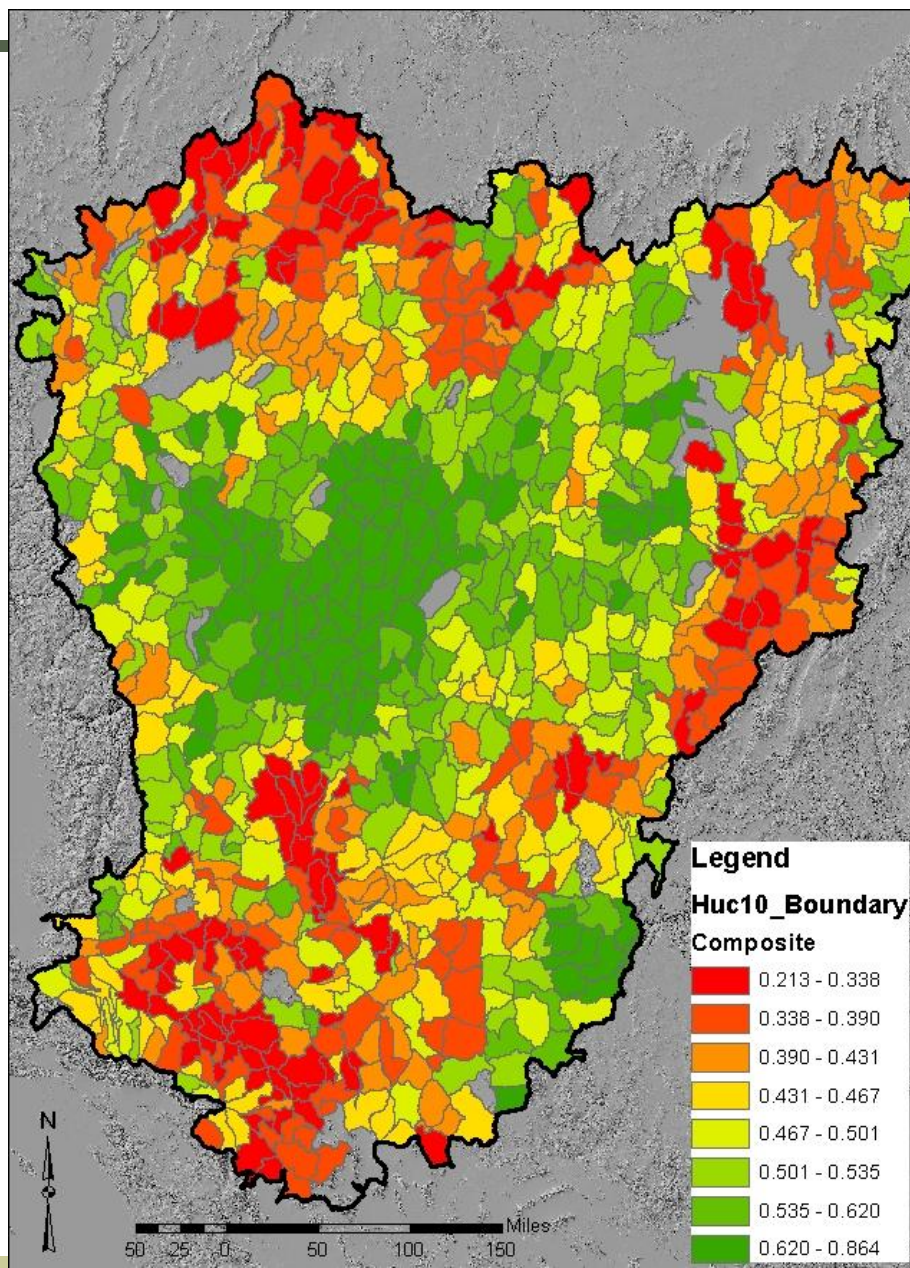
Salt Desert Scrub = 20% Status
Score = 0.9 = 9.0

Sagebrush Shrub = 50% Status
Score = 0.5 = 5.0

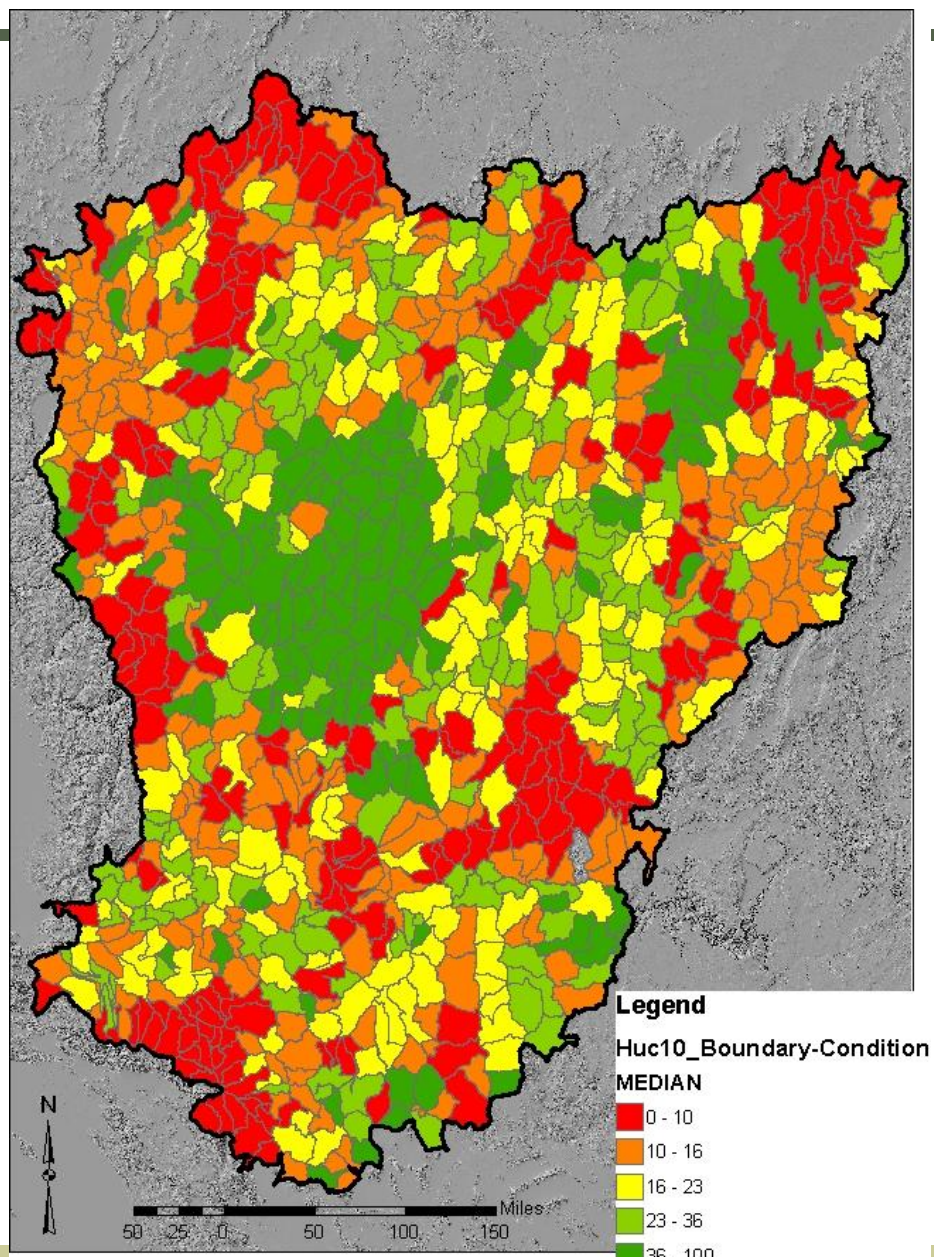
Terr. Coarse Filter EI Index =
 $(0.3 \times 6) + (0.2 \times 9) + (0.5 \times 5) =$
 $6.1 = 0.61$ = 'transitioning' **NOTE**
EFFECT OF COMBINING
SCORES ACROSS ELEVATION
ZONES



Combined Status (several major upland veg CEs)



IEI based on Landscape Condition (0-100 scale)



Break



Assessing current ecological integrity of aquatic / wetland / riparian CEs

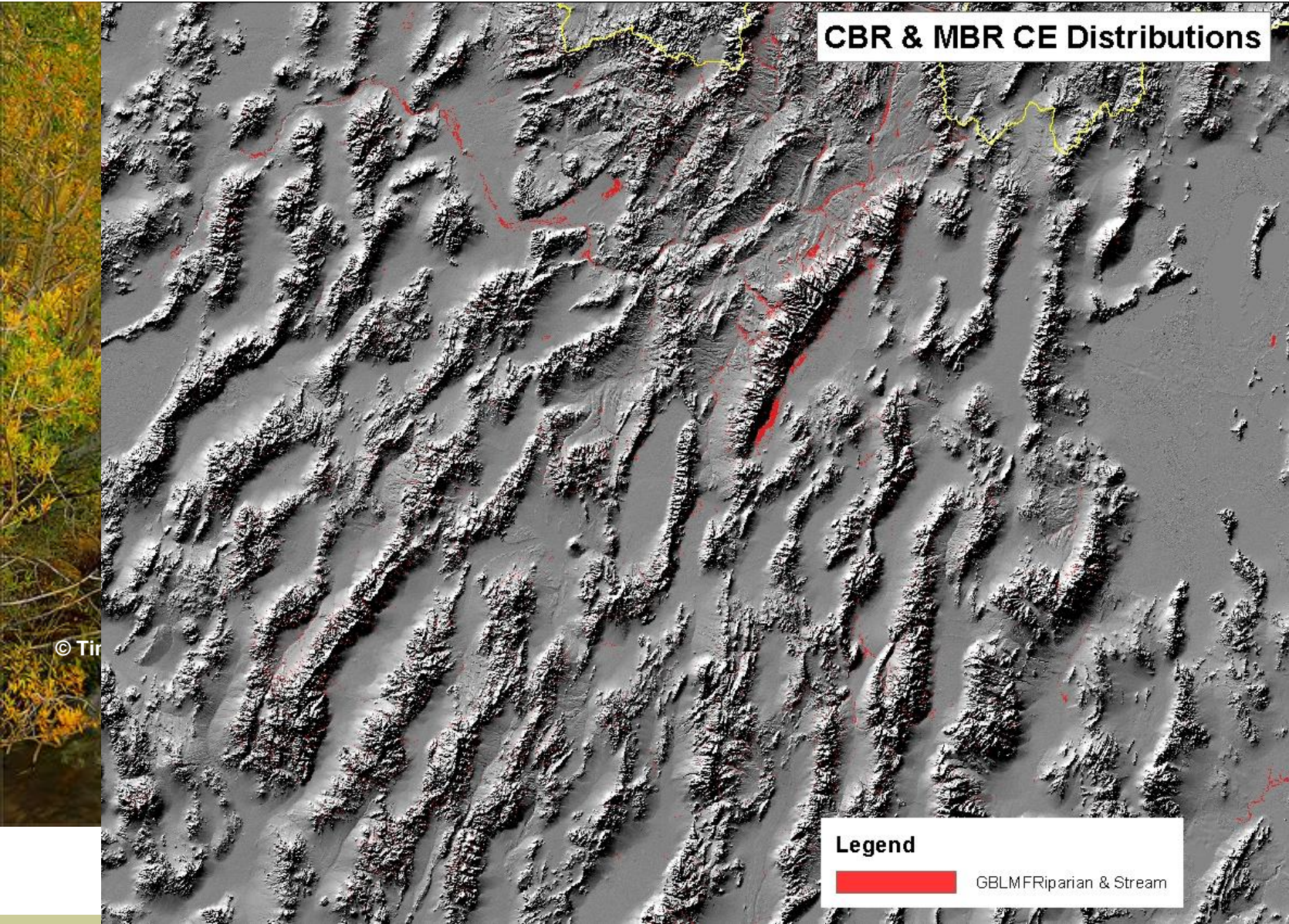
CEs & Status

- CE Class I – Terrestrial Coarse Filter
- CE Class II – Terrestrial Fine Filter
- CE Class IV - Aquatic Coarse Filter

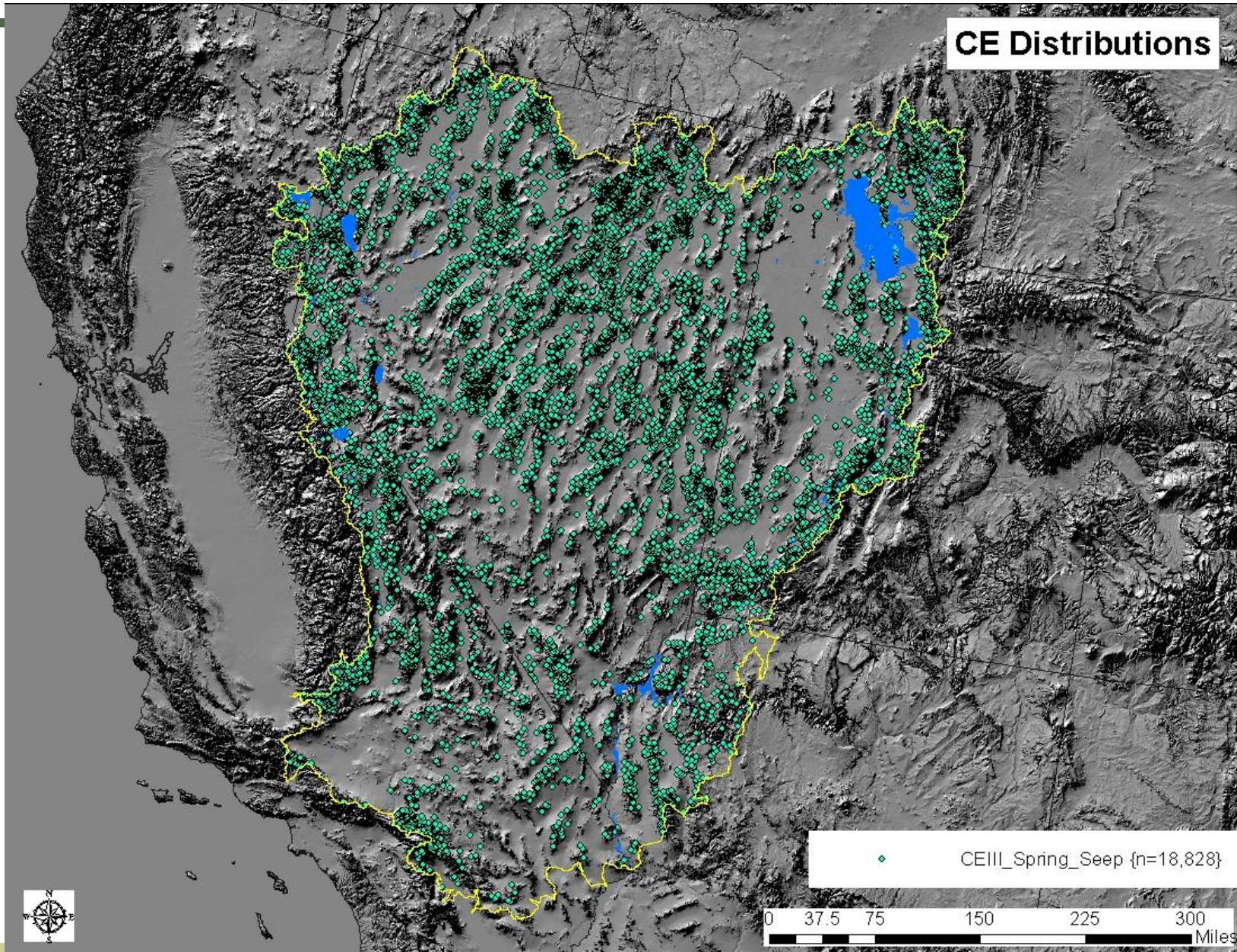
Overview

- Two aquatic CE types to illustrate assessment
 - *Great Basin Foothills & Lower Montane Riparian-Stream System* [illustrated with CBR]
 - *Mojave Desert Springs & Seeps* [illustr. MBR]
- CE distributions
- Ecological Status scorecard framework
 - Methods, preliminary results, improvements
- MQs, approaches
- Continue discussion of scorecard roll-up

Great Basin Lower Montane Riparian and Stream



Springs and Seeps



Riparian & Stream CE Conceptual Model

Regional Climate, Geology, Hydrology,
Connectivity & Ecological Dynamics

Regional Land & Water Use; Roads &
Introductions of Invasive Species

• Landscape Condition (*near-stream & watershed*)

- Surface Hydrology
- Groundwater Hydrology
- Water Chemistry
- Hydro-geomorphology

- Biotic Condition
 - Riparian Vegetation
 - Aquatic Species

• Continuity (Connectivity)

Aquatic CE Indicator Data Types

- Linear and point CEs
 - Remote sensing not always appropriate
 - Require reach and/or site-level data
- May aggregate multiple data sources, if...
 - Comparable data collection methods
 - Spatially representative
 - Relatively concurrent sampling
- Can also use indirect indicators
 - Data on dominant stressors as surrogate measures of their effects
 - Remote sensing data often useful
 - Provide clear link to Change Agents



Aquatic CE Key Ecological Attributes

- Extent/Size
 - *Addresses fragmentation*
- Surrounding Land Use
 - *Indicators based on stressors*
- Hydrology Condition
 - *Indicators based on stressors*
- Water Quality Condition
 - *Combination of direct & stressor indicators*
- Wetland Terrestrial Biota Condition
 - *Indirect indicators of vulnerability to invasives*
- Aquatic Biota Condition
 - *Indirect indicators of vulnerability to invasives*
- Landform Condition
 - *Indicators based on stressors*



Aquatic CE Status Scorecard (1)

| Indicator | Justification | Sustainable | Transitioning | Degraded |
|---|--|---|--|---|
| Key Ecological Attribute: Extent / Size (1 indicator) | | | | |
| Riparian Corridor Continuity | Uses the Landscape Condition Model Index (LCMI) to measure how many fragments are created by the interruption of the natural riparian corridor by non-natural land use within a 200m buffer zone | >20% of riparian reach with gaps/breaks due to cultural alteration | >20-50% of riparian reach with gaps/breaks due to cultural alteration | >50% of riparian reach with gaps/breaks due to cultural alteration |
| Key Ecological Attribute: Surrounding Land Use Context (4 indicators) | | | | |
| Landscape Connectivity | Uses the LCMI to measure the percent of unaltered (natural) habitat within a 1,000 ha (10km ²) area or surrounding HUC | Intact to Variegated: Embedded in 60-100% natural habitat; habitat connectivity is generally high, but lower for species sensitive to habitat modification. | Fragmented: Embedded in 10-60% natural habitat; connectivity is generally low, but varies with mobility of species and arrangement on landscape. | Relictual: Embedded in < 10% natural habitat; connectivity is essentially absent. |
| Landscape Condition Model Index | Assesses land use intensity at point of use and a decay factor | Cumulative level of impacts is sustainable. Landscape Condition Model Index is > 0.8 | Cumulative level of impacts is transitioning system between a sustainable and degraded state. Landscape Condition Model Index is 0.8 – 0.5 | Cumulative level of impacts has degraded system. Landscape Condition Model Index is< 0.5 |
| Atmospheric Deposition | Rate of wet deposition of NO ₃ and Hg per unit area within HUC | < 5 µg/m ² Hg AND < 1.5 kg/ha NO ₃ | NOT Sustainable or Degraded | > 6.4 µg/m2 Hg OR > 2.5 kg/ha NO3 |
| Point-Source Pollution | Count of permitted and legacy point discharges per HUC10 per states permits | None | 1-2 | >2 |
| Key Ecological Attribute: Hydrology Condition (4 Indicators) | | | | |
| Flow Modification by Dams | "F" Index (Theobald et al. 2010) measures upstream dam storage capacity relative to annual stream discharge | F index >0.90 | F index = 0.75- 0.90 | F Index <0.75 |
| Surface Water Change: Upstream and within-System Augmentation / Diversion | Average annual surface water diversions and augmentation as a percent of annual mean cumulative drainage network runoff for a HUC from NHD | Percent added/removed is <10% of average annual mean cumulative drainage network runoff | Percent added/removed is 10-25% of average annual mean cumulative drainage network runoff | Percent added/removed is >25% of average annual mean cumulative drainage network runoff |
| Ground Water Change: Augmentation/Withdrawal of Aquifers | Average annual groundwater withdrawals and augmentation as a percent of annual mean cumulative drainage network runoff for a HUC from NHD | Percent added/withdrawn is <10% of average annual mean cumulative drainage network runoff | Percent added/withdrawn is 10-25% of average annual mean cumulative drainage network runoff | Percent added/withdrawn is >25% of average annual mean cumulative drainage network runoff |
| Groundwater Recharge | Percent of total recharge area [land > 2,000 m elevation, per findings from Flint & Flint (2007)] within HUC with natural land cover as determined via LCMI | >67% | 34-66% | <34% |

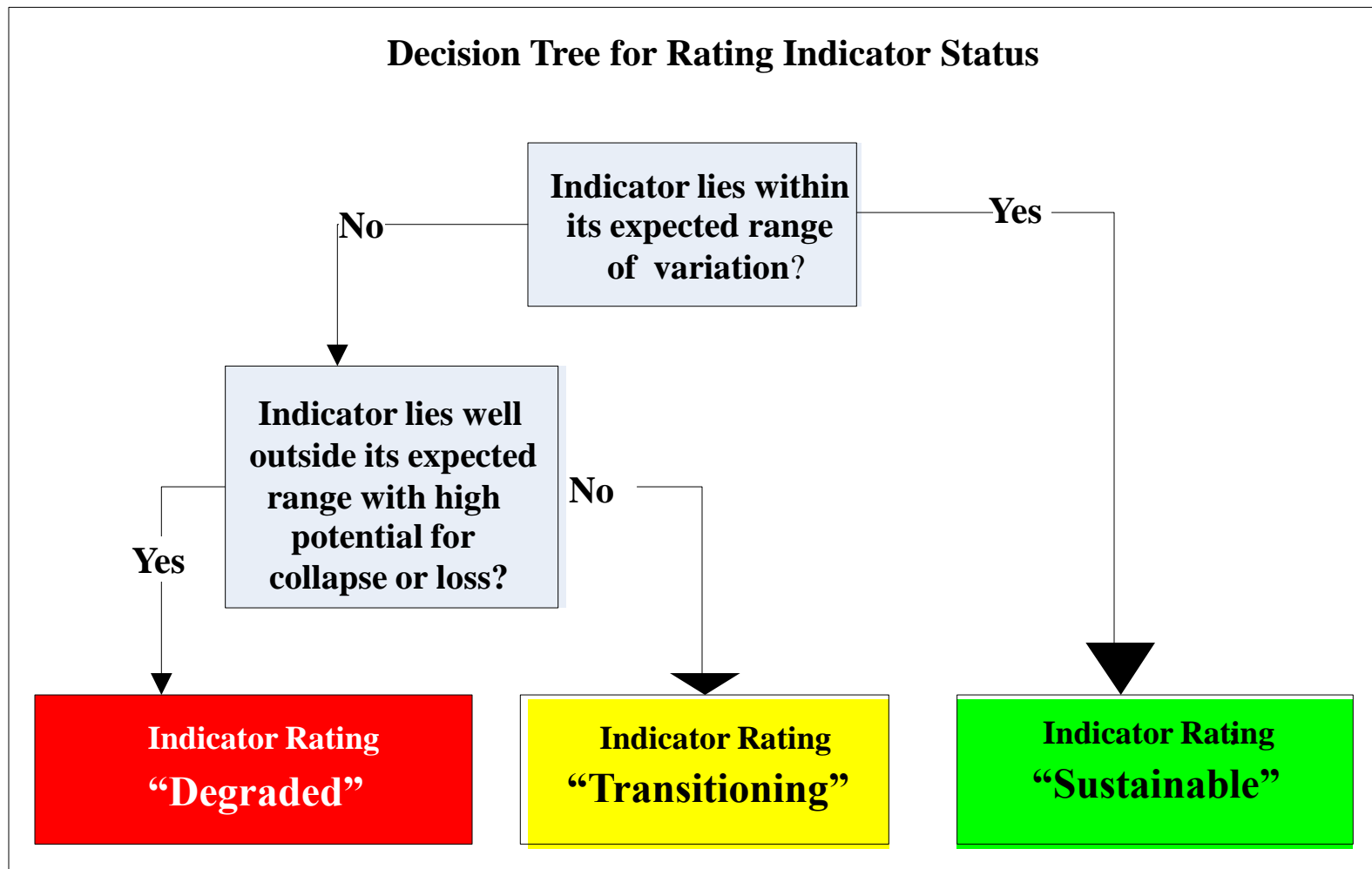


Aquatic CE Status Scorecard (2)

| | | Rating | | |
|---|--|--|---|---|
| Indicator | Justification | Sustainable | Transitioning | Degraded |
| Key Ecological Attribute: Water Quality Condition (2 indicators) | | | | |
| State-Listed Water Quality Impairments | Measures integrity of water quality conditions based on presence and severity of water quality impairments reported under State 303(d) requirements for the federal Clean Water Act – excluding nutrient enrichment, which is addressed by a separate key ecological attribute | Impairment < 10% of CE extent or area within HUC | Impairment = 10-50% of CE extent or area within HUC | > 50% of CE extent or area within HUC |
| Sediment Loading Index | Index values of total Suspended Sediment (developed by NSPECT) which are based on percent of land uses (NLCD) that contribute excess sedimentation and suspended solids via surface water runoff and overland flow into a wetland, as measured by with the 200 m buffer area | 0.8 – 1.0 | 0.51– 0.79 | <0.5 |
| Key Ecological Attribute: Wetland Terrestrial Biota Condition (1 Indicator) | | | | |
| Wetland/Riparian Vulnerability to Invasive Woody Species | A model of risk of invasive wetland species (tamarisk and Russian olive) based on several factors, including: proximity to known populations of invasive species; distance and height above perennial or intermittent streams; slope; aspect; and hydric soils. | Riparian area has low (<25%) vulnerability to invasion | Area has moderate (25-60%) vulnerability | Area has high (>60%) vulnerability of invasion |
| Key Ecological Attribute: Aquatic Biota Condition (1 Indicators) | | | | |
| Invasive Aquatic Index | Sums the within-HUC and surrounding-HUC Aquatic Invasive Index values | See separate table. Metrics include: (1) Number of invasive taxa present in CE; (2) Number of invasive taxa present in HUC; (3) Number of CEs infected; (4) Number of trophic levels in CE; (5) Number of trophic levels in HUC; (6) Flow network connectivity; (7) Recreational use; (8) Other human use; (9) Time since first invasion | | |
| Key Ecological Attribute: Landform Condition (1 indicator) | | | | |
| Lateral Floodplain Hydrologic Connectivity | Uses Riparian zone/Valley Confinement Index (Theobald 2010) to measure extent of land uses that separate present stream channel from present adjacent floodplain | Few or no geomorphic modifications to floodplain; up to 25% of stream banks affected | Multiple geomorphic modifications; 25 – 75% of stream banks affected. | Multiple geomorphic modifications; > 75% of stream banks affected |

Rating Indicator Status

Decision Tree for Rating Indicator Status



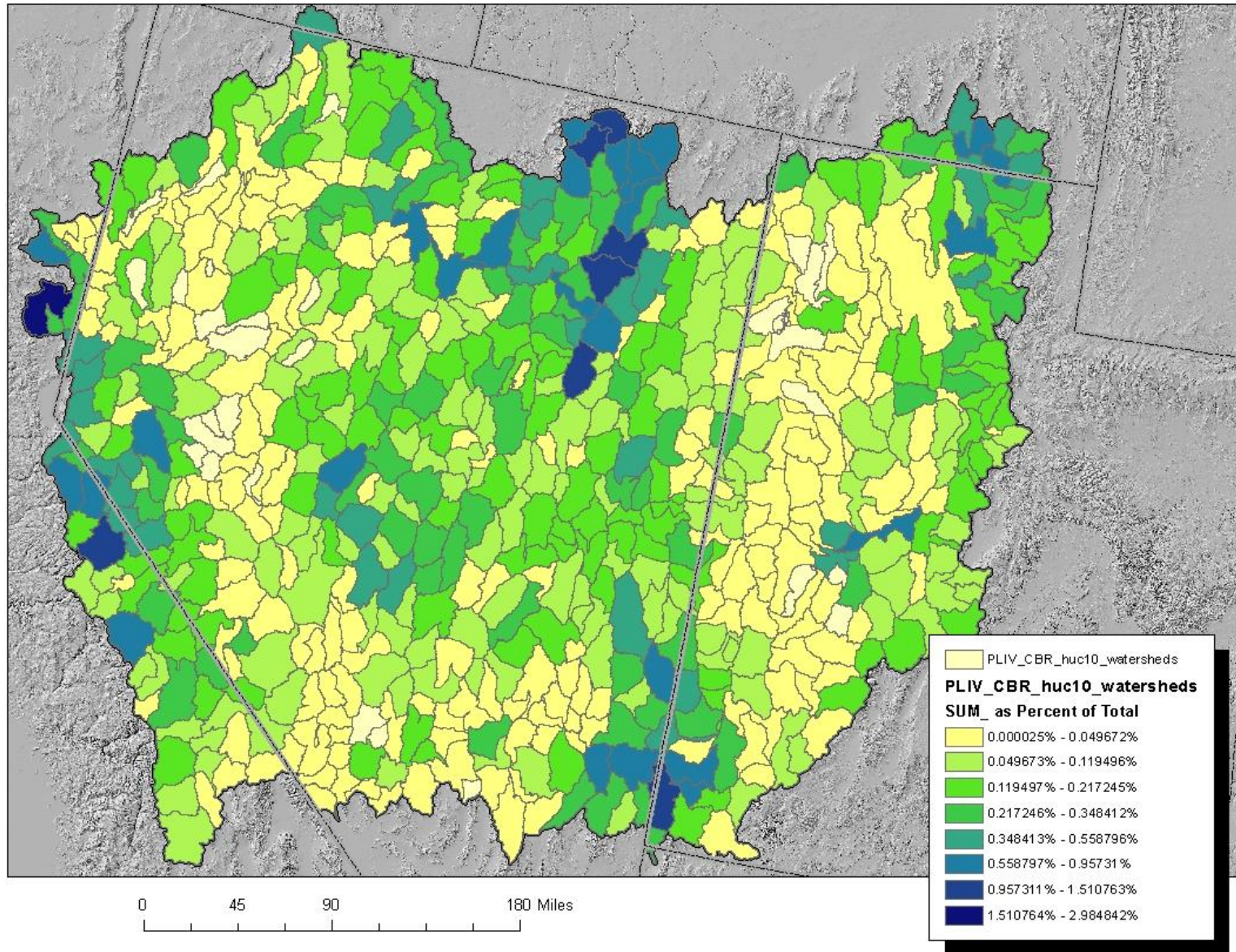
Generalized Aquatic MQs

- Where are the aquatic Conservation Elements (CEs); what is their ecological status; and where are they most degraded?
- What current natural and man-made surface water resources support these CEs; and which are perennial, ephemeral, etc.?
- What is the natural variation of monthly discharge and monthly base flow for stream and river CEs?
- Where are the likely groundwater recharge areas for aquatic CEs; and where may these areas be affected by Change Agents?
- What areas have invasive species significantly affected; what is their likely future distribution; and which have restoration potential?
- Where are aquatic CEs degraded due to surface and groundwater uses; and where will changes in water use potentially affect aquatic CEs?
- Where will aquatic CEs experience significant departures from historic climate variation that could affect hydrologic and temperature regimes?
- Where are aquatic CEs degraded due to atmospheric deposition of pollutants, as represented specifically by nitrate and mercury deposition?

Great Basin Foothills & Lower Montane Riparian-Stream System



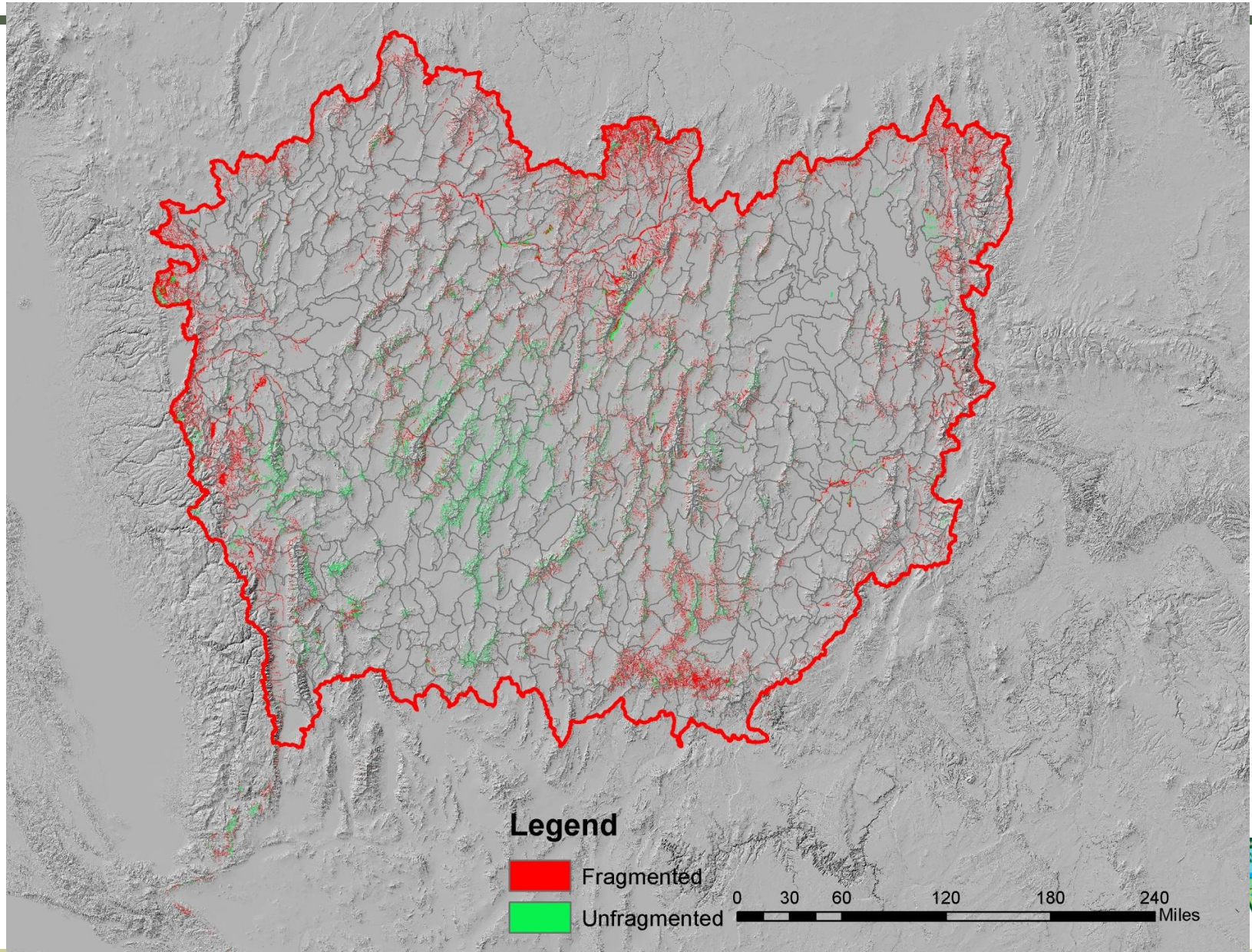
Distribution of GBFLMRSS in CBR



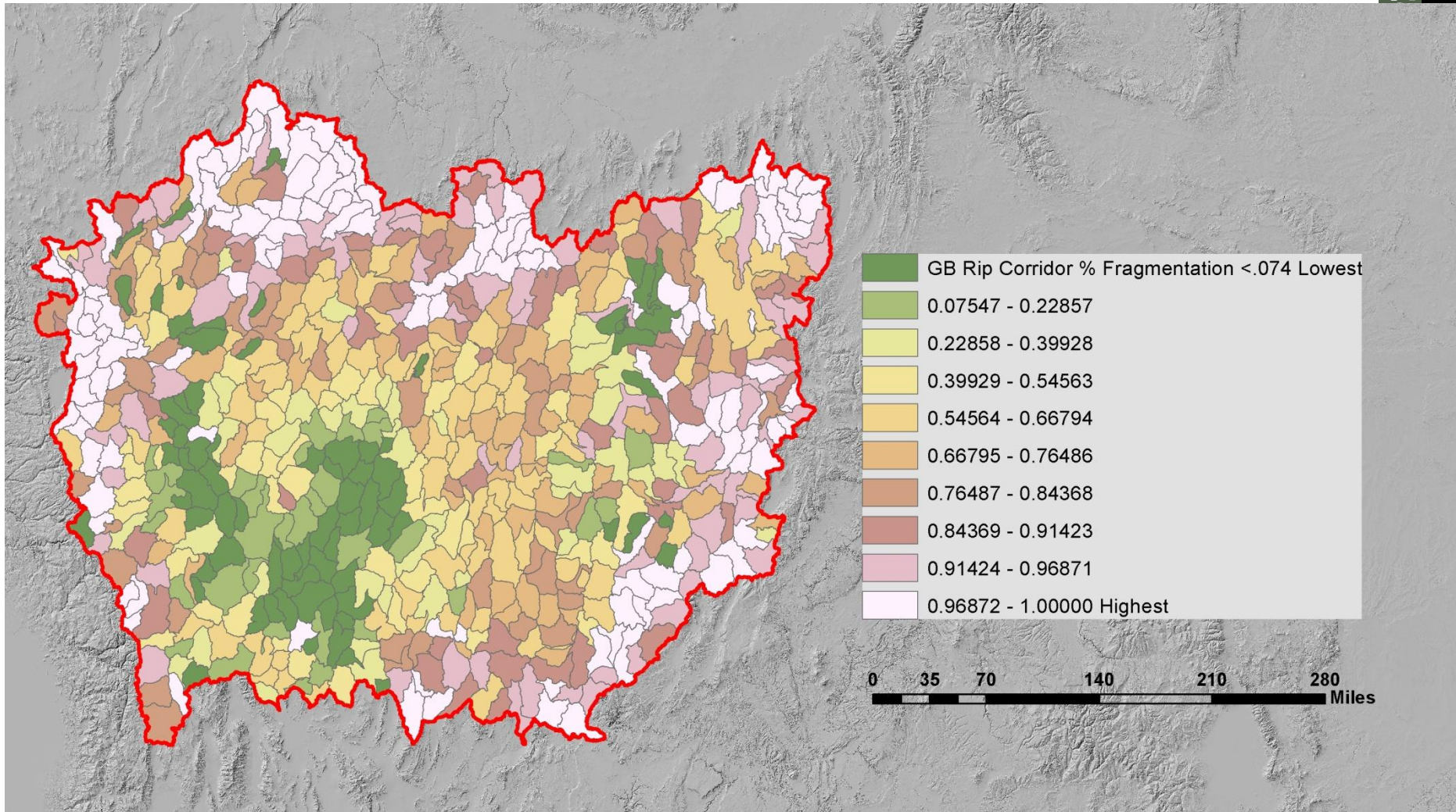
Preliminary Results

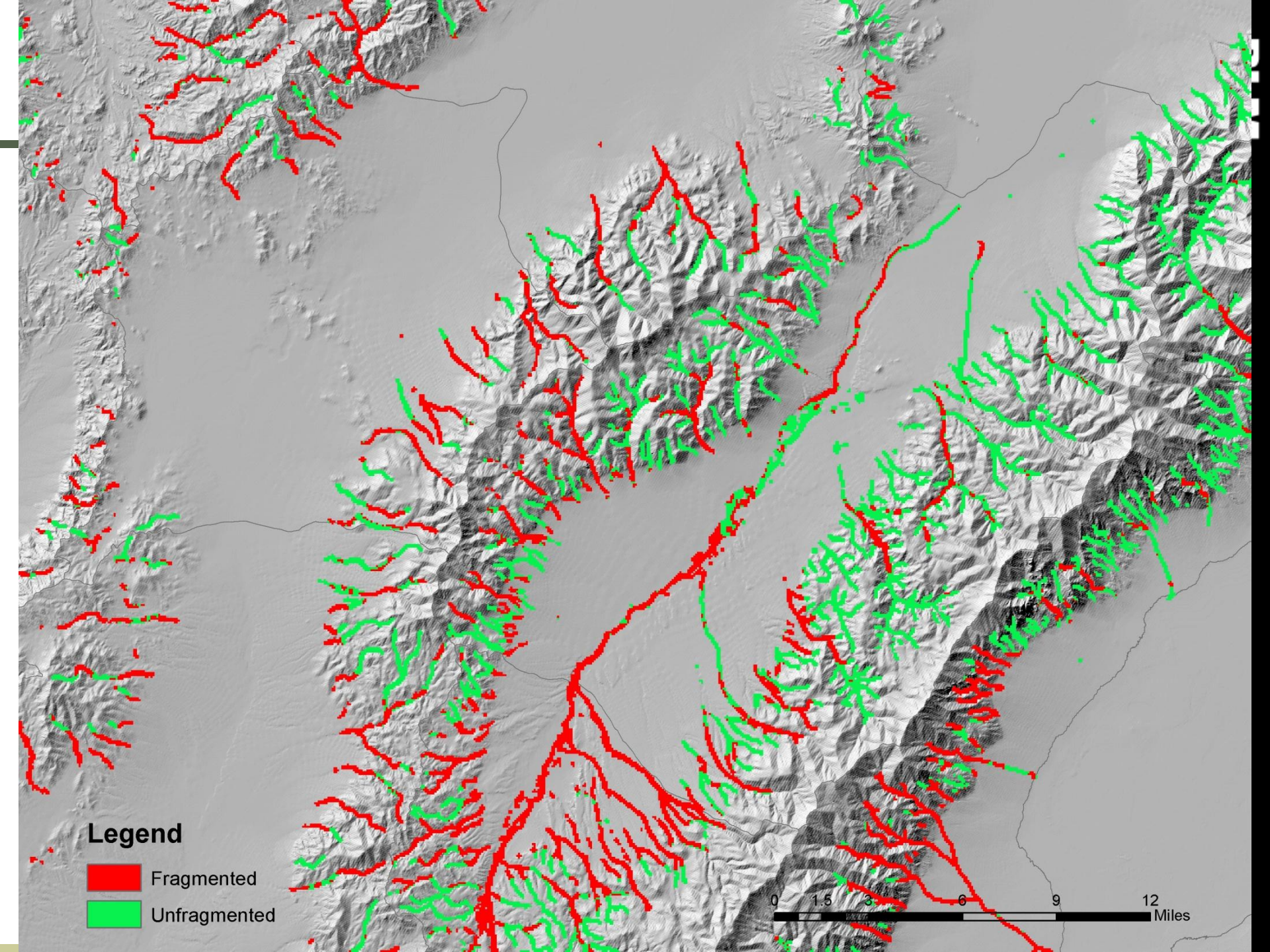
- KEA: Size
 - *Riparian Corridor Continuity*
- KEA: Surrounding Land Use Context
 - *Landscape Condition Model*
 - *Atmospheric Deposition*
 - *Point Source Pollution*
- KEA: Aquatic Biota Condition
 - *Aquatic Invasives Index*

Riparian Corridor Continuity



Riparian Corridor Continuity

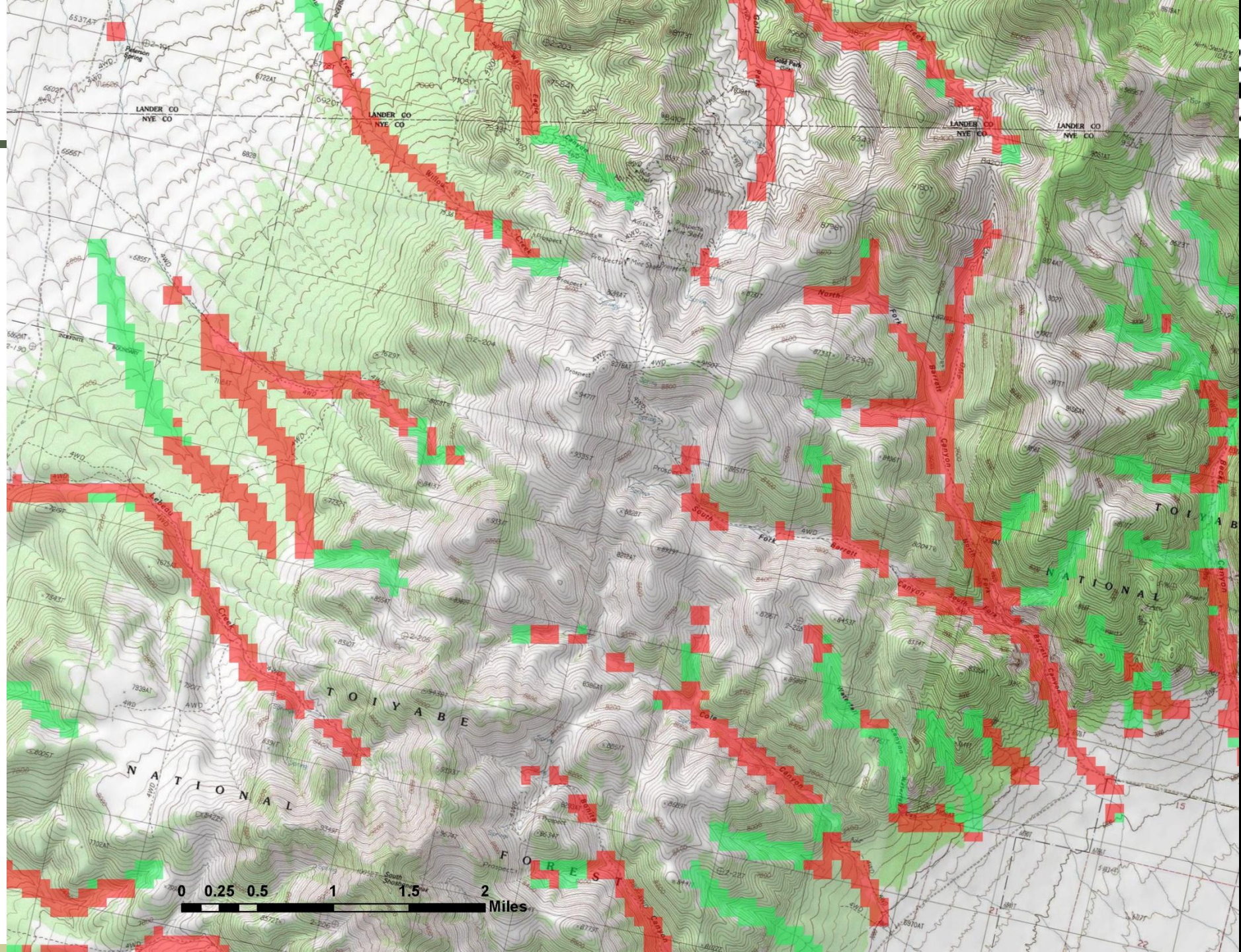


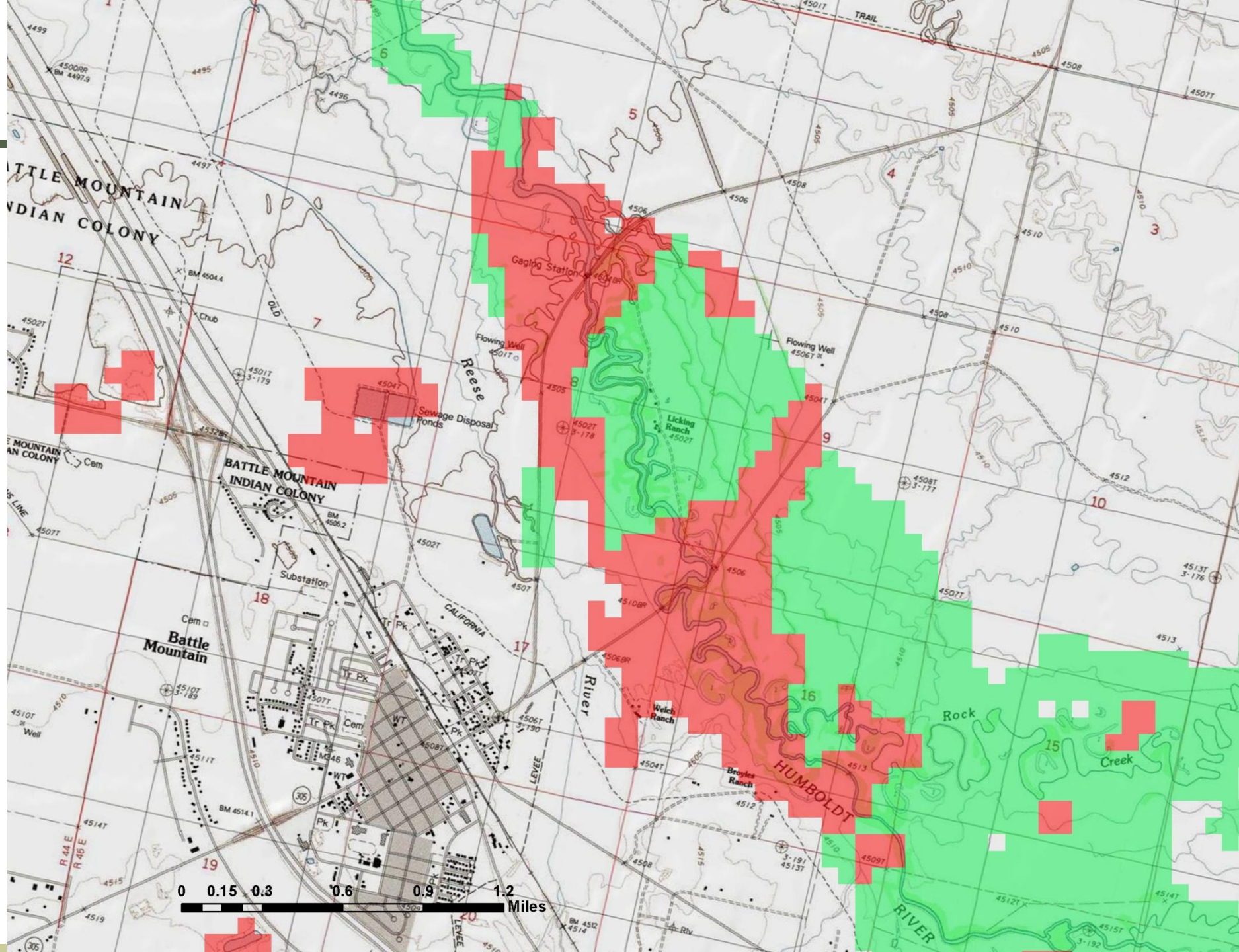


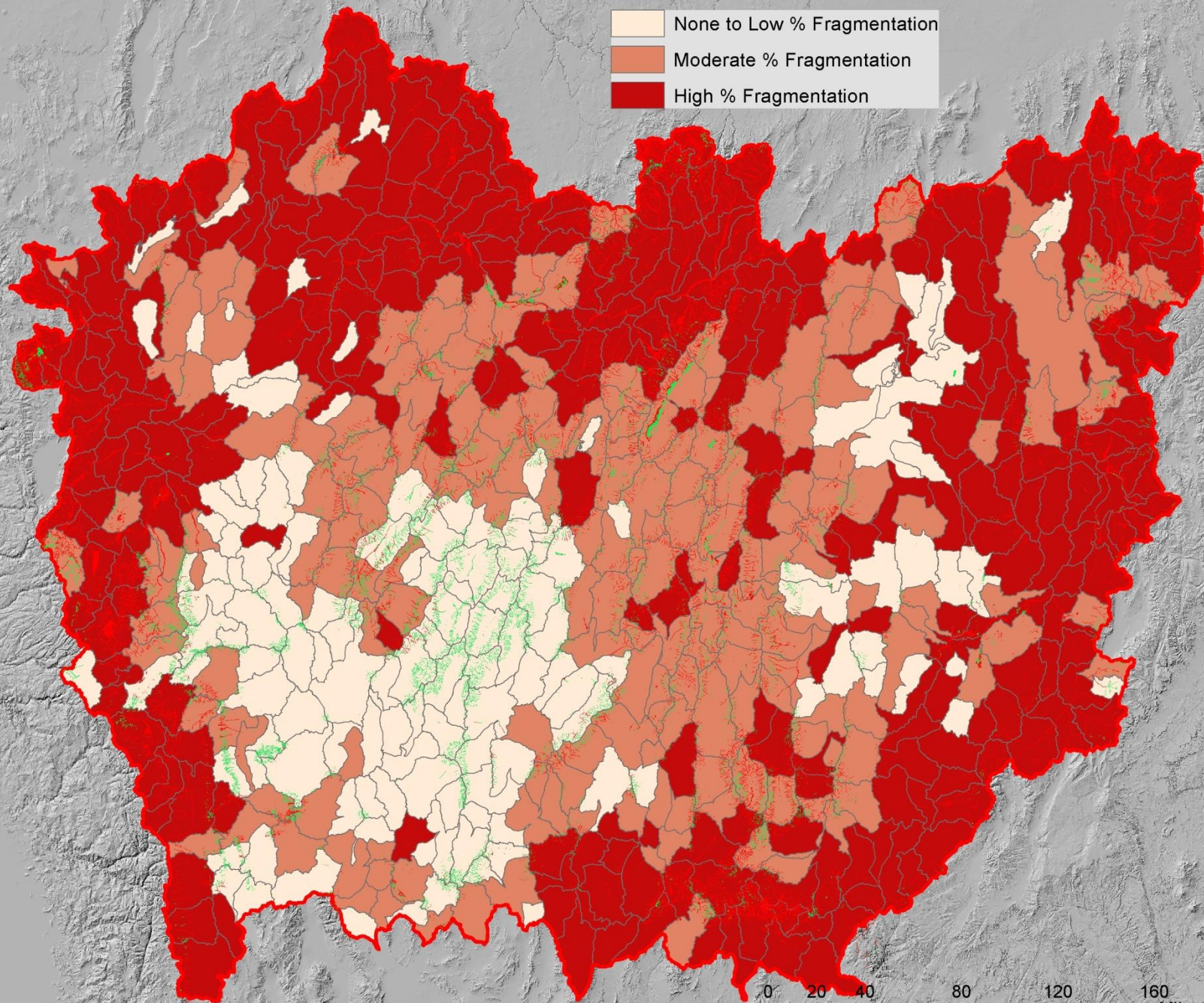
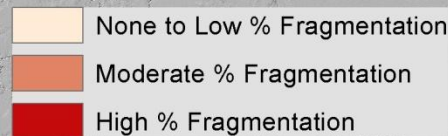
Legend

- Fragmented
- Unfragmented

0 1.5 3 6 9 12 Miles

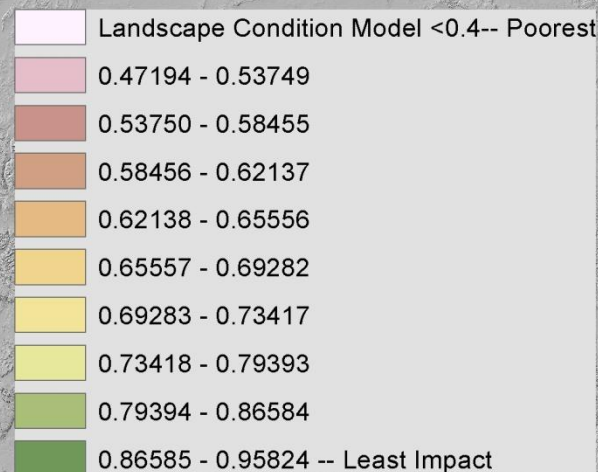
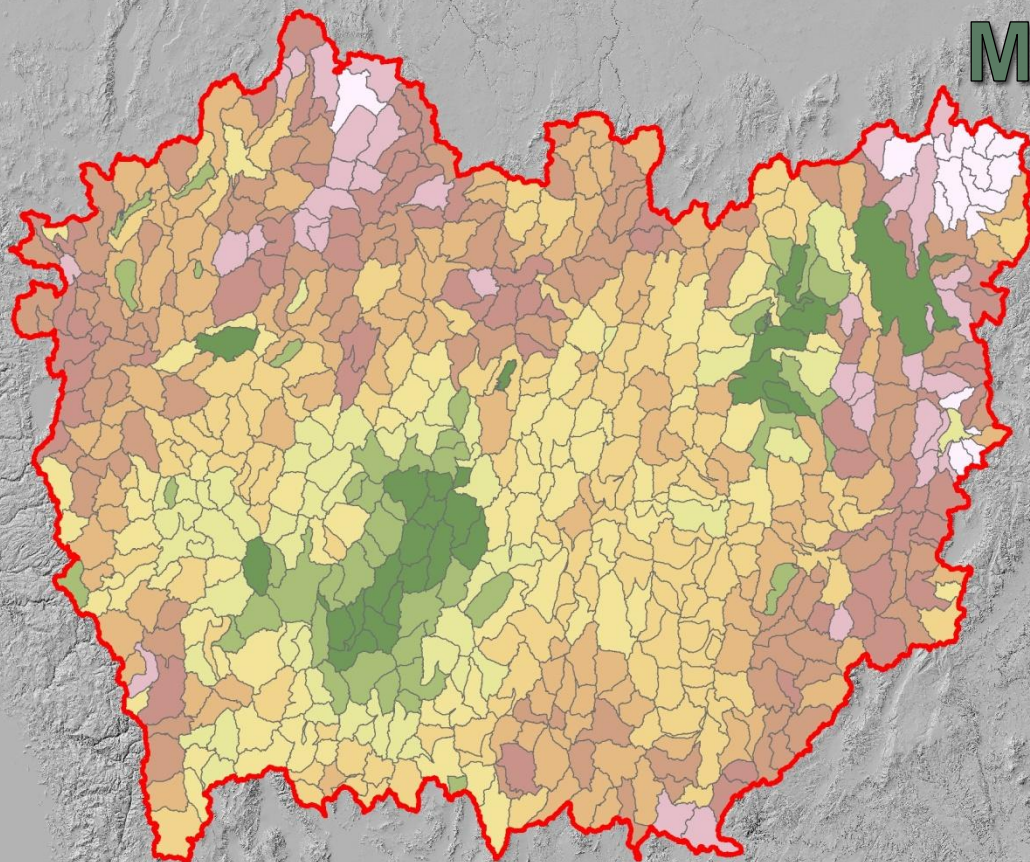






Surrounding Land Use Context

Landscape Condition Model Index

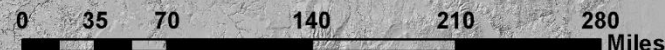
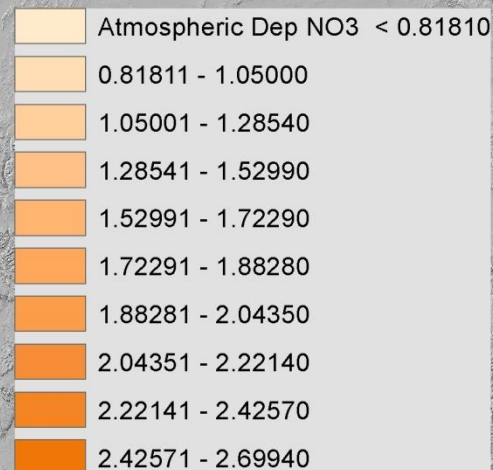
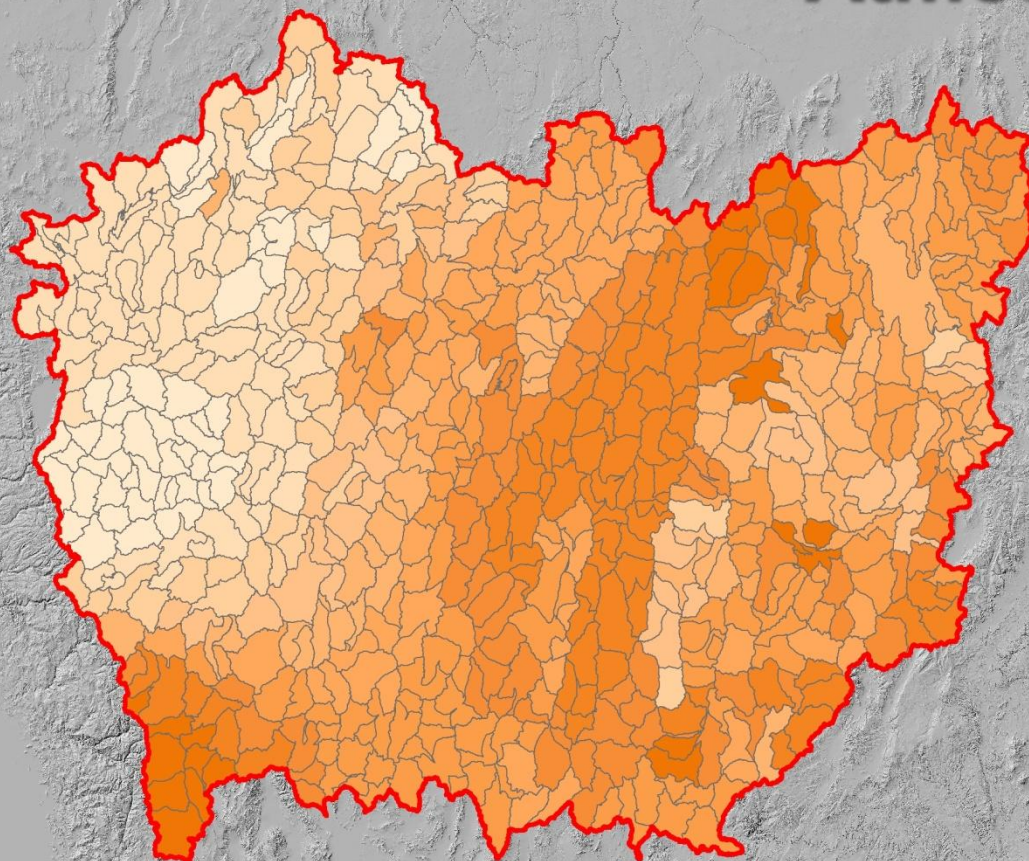


0 35 70 140 210 280 Miles



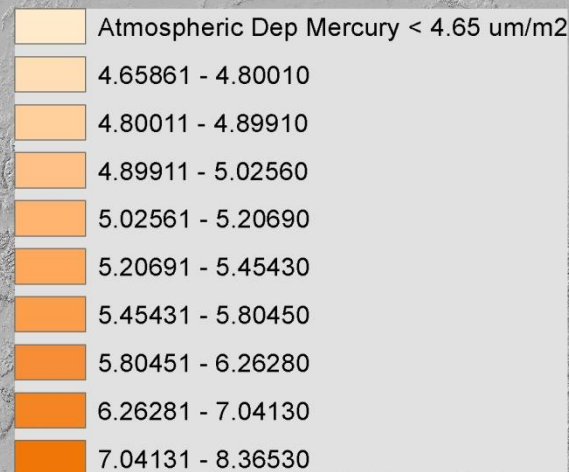
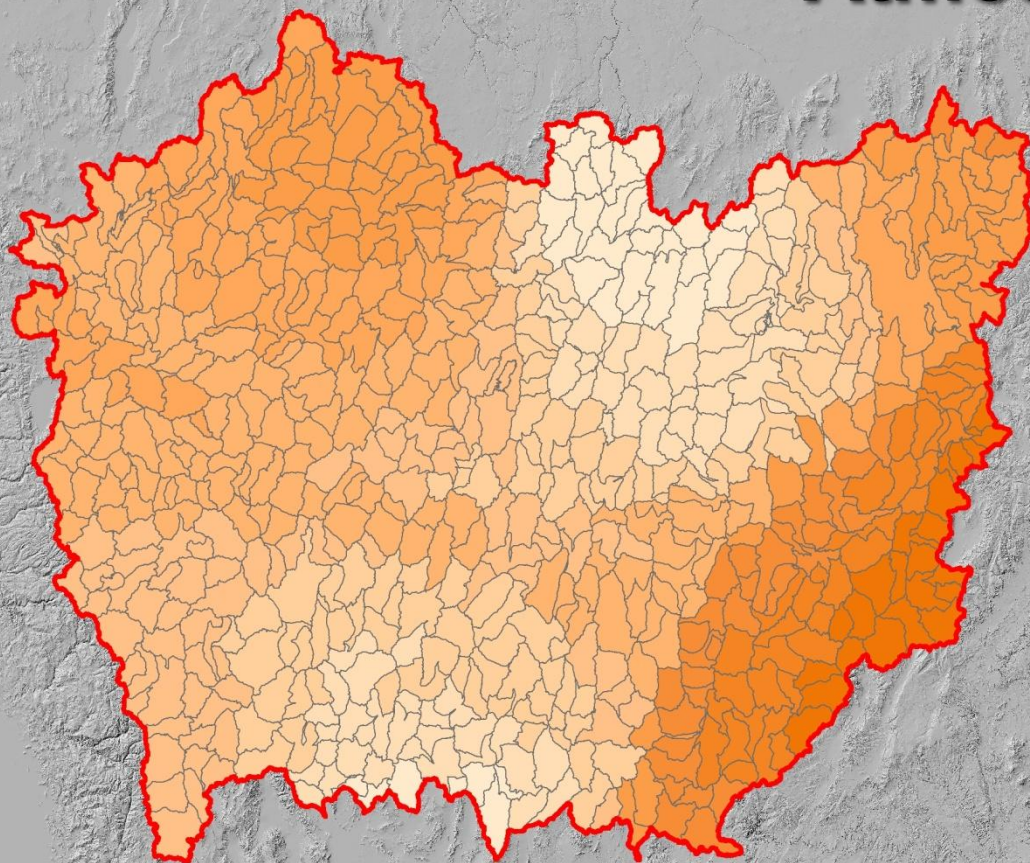
Surrounding Land Use Context

Atmospheric Deposition: Nitrate (wet)

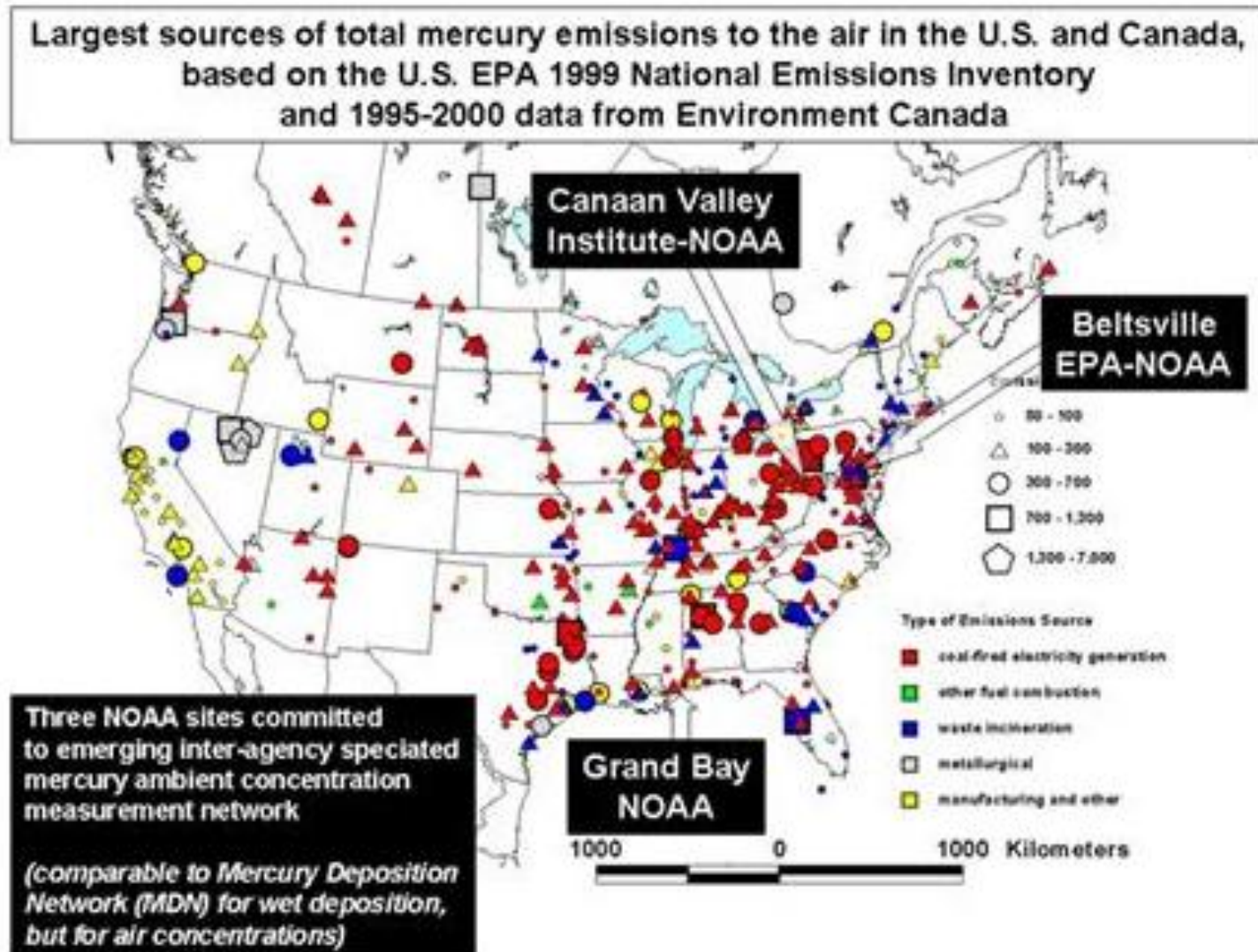


Surrounding Land Use Context

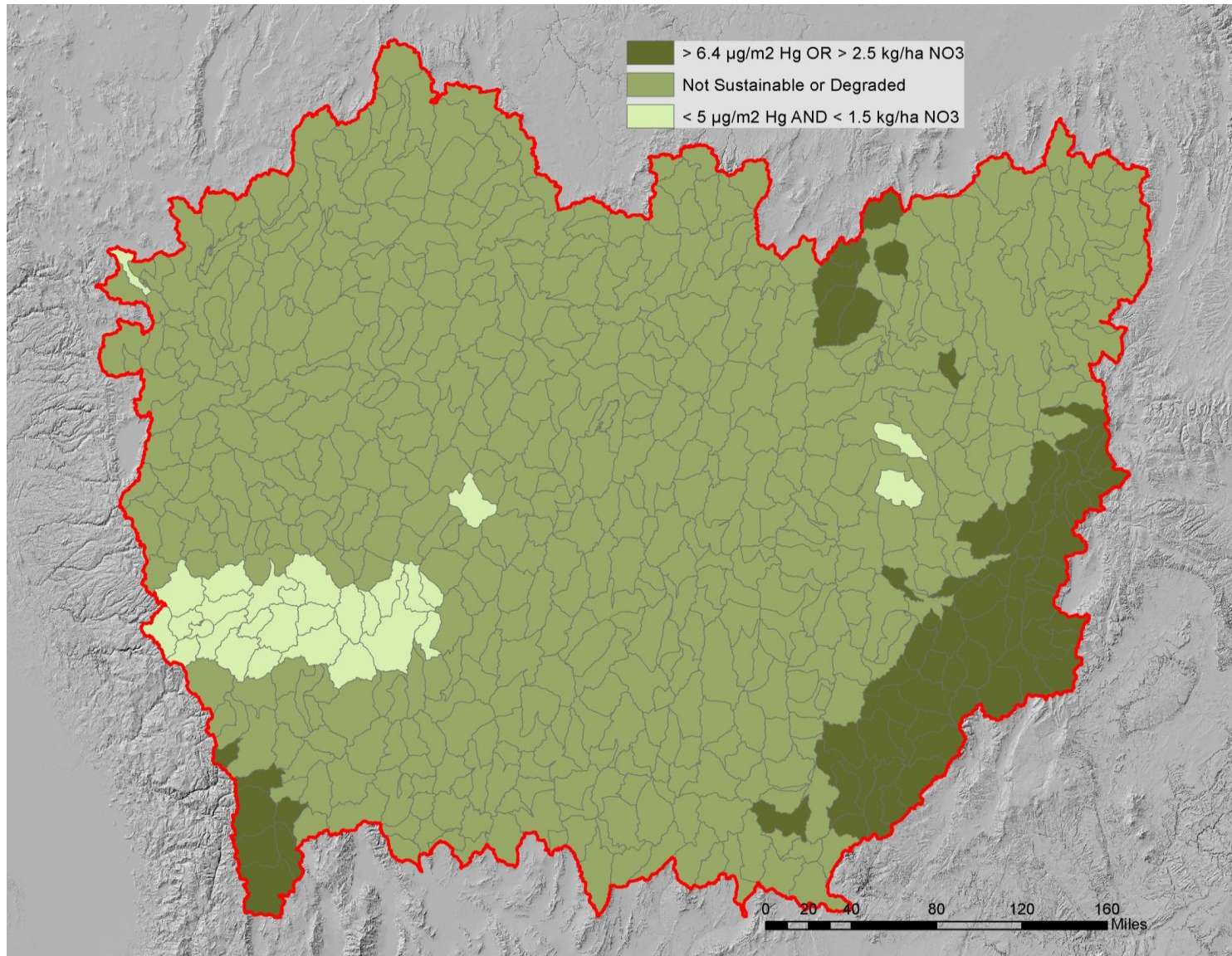
Atmospheric Deposition: **Mercury (wet)**



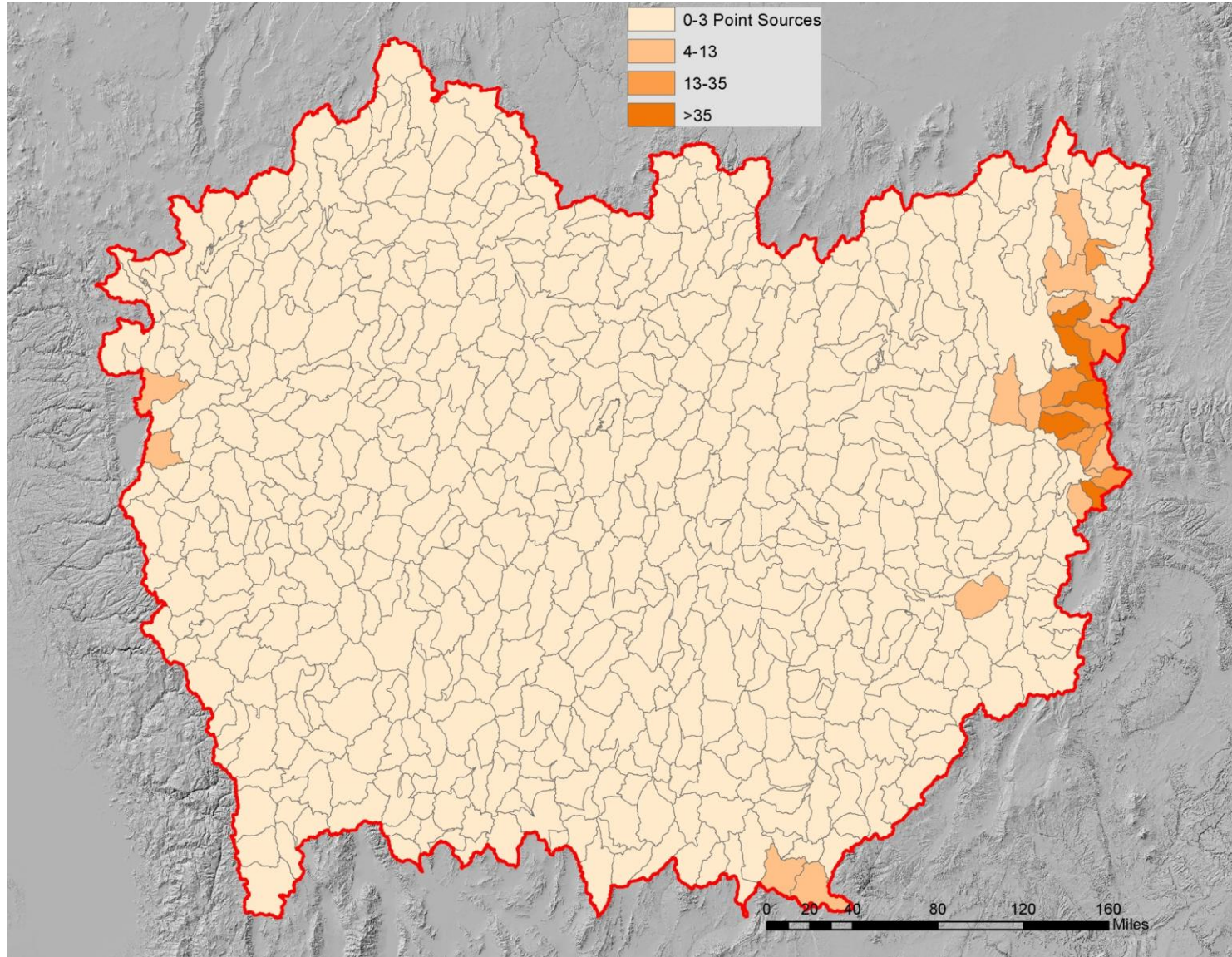
Sources of Atmospheric Deposition



Atmospheric Deposition: Combined

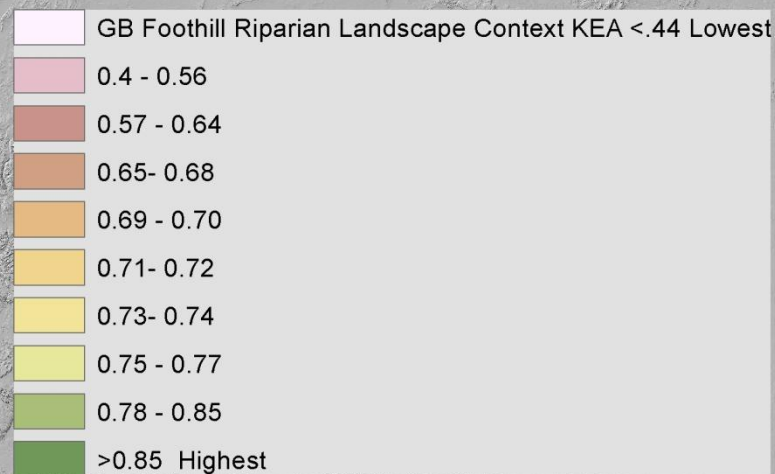
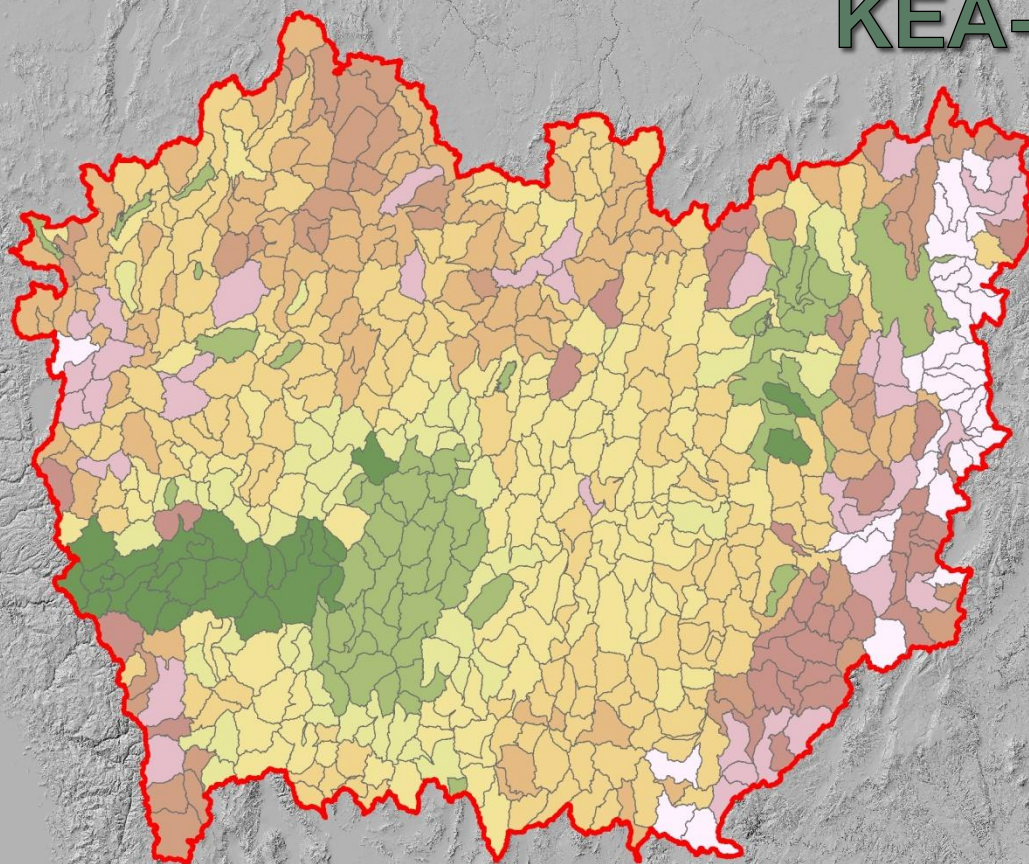


Point-Source Pollution



Surrounding Land Use Context

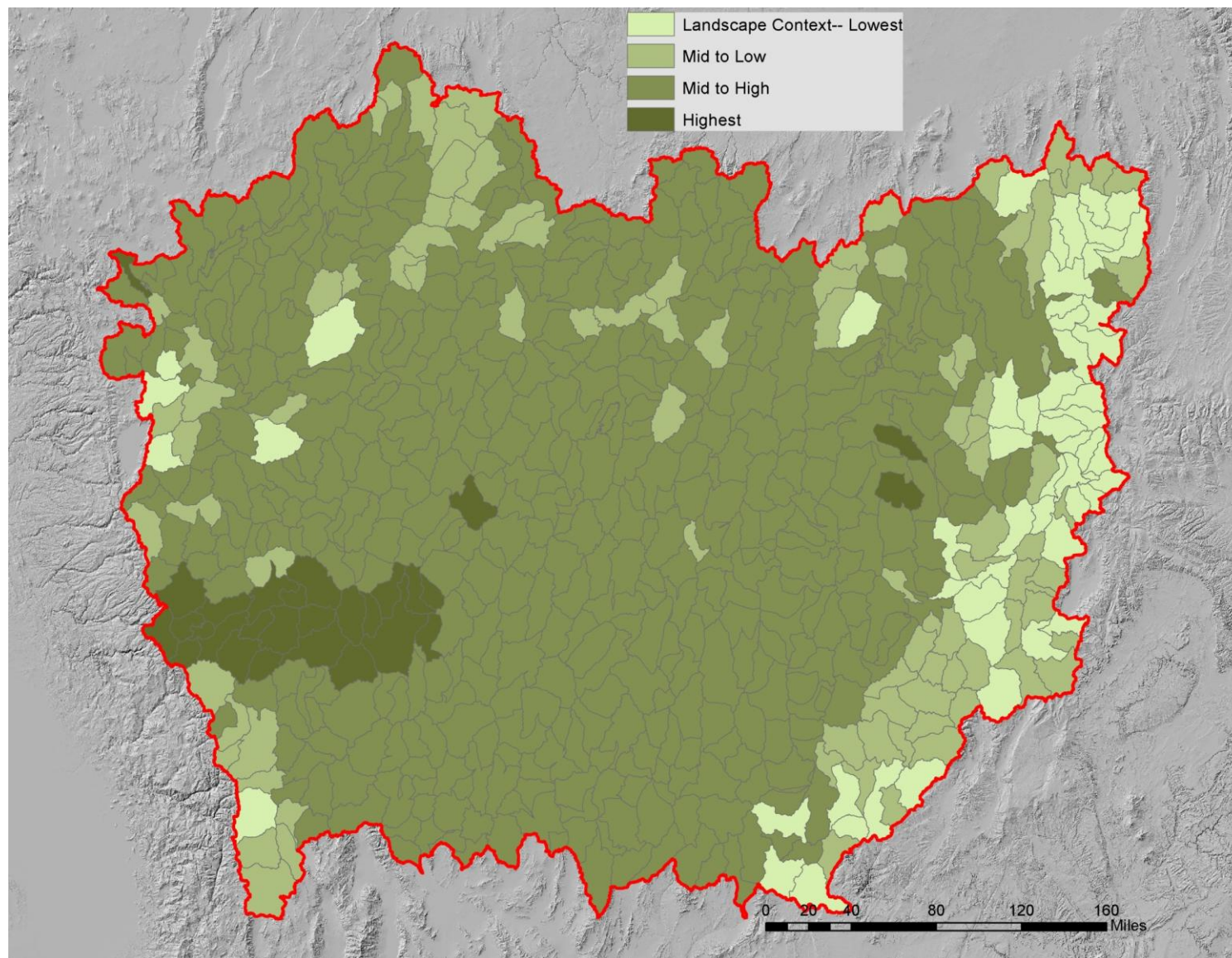
KEA-Level Score Roll-up



0 35 70 140 210 280 Miles



Surrounding Land Use Context KEA Rollup



Aquatic Biota Condition

- Benthic Macroinvertebrate Assemblage Composition Index

- *Data points too few, scattered*

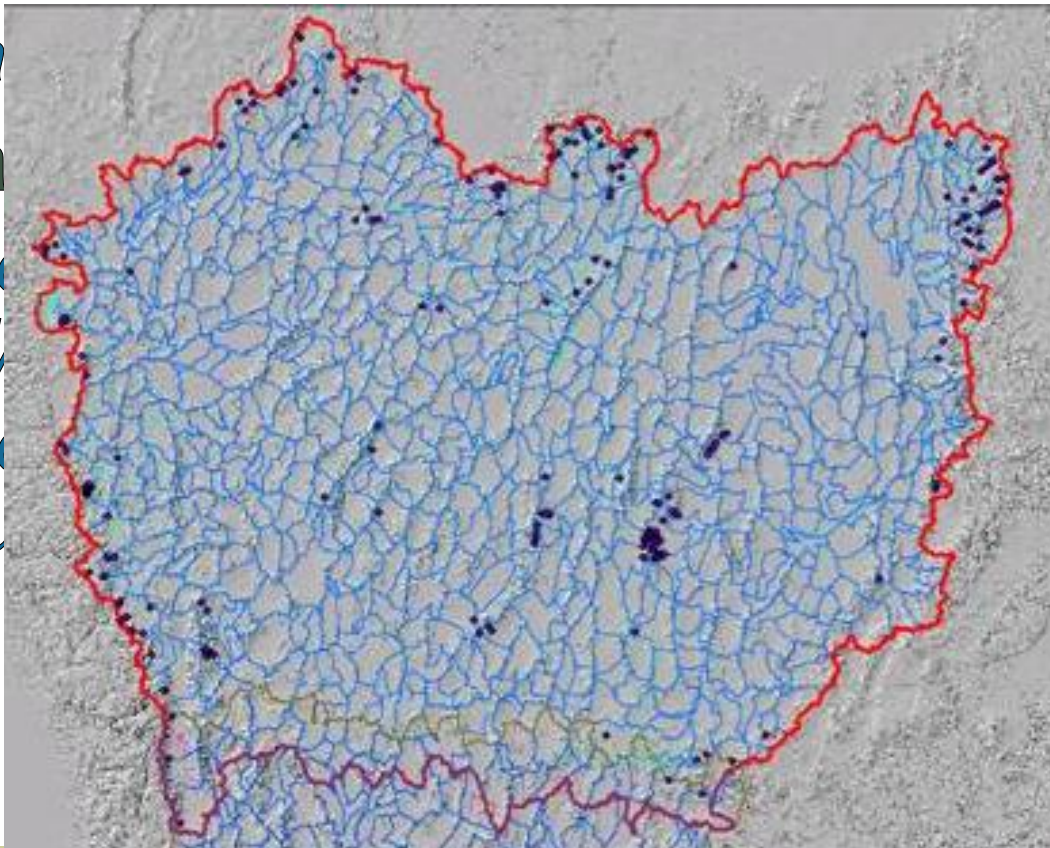
- *Sta*

ance

- Aquatic

- *One*
CE

- *One*
futu

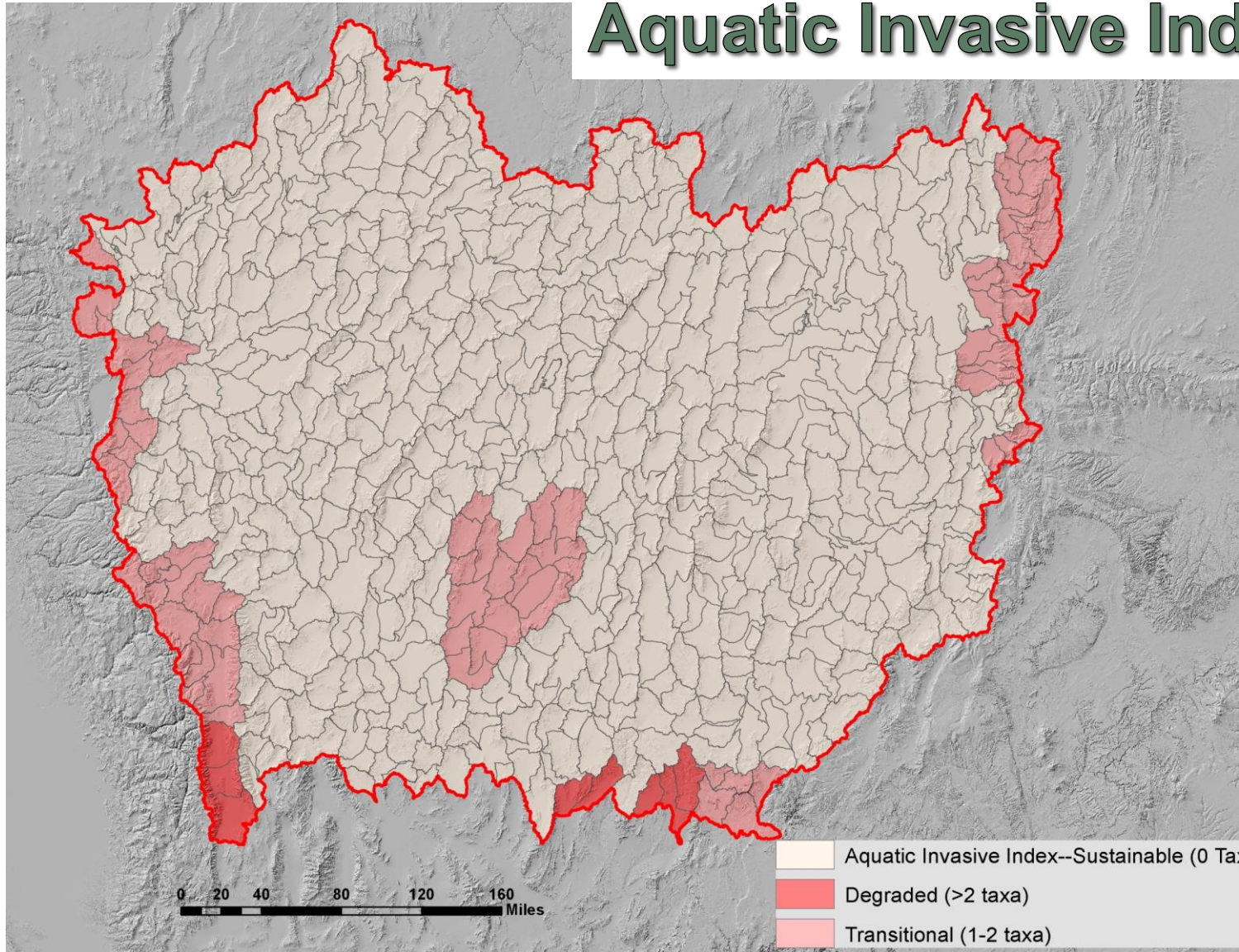


Aquatic Invasive Species Index

- Index based on 6 metric types/9 metrics
 - *Number of invasive taxa in CE, HUC (1,2)*
 - *Number of CEs infected in HUC (3)*
 - *Trophic levels present in CE, HUC (4,5)*
 - *Connectivity to up/downstream CEs (6)*
 - *Human use of area (7,8)*
 - *Time since first invasion (9)*
- Each metric scored D/T/S
- Index integrates all metrics by CE, HUC

Aquatic Biota Condition

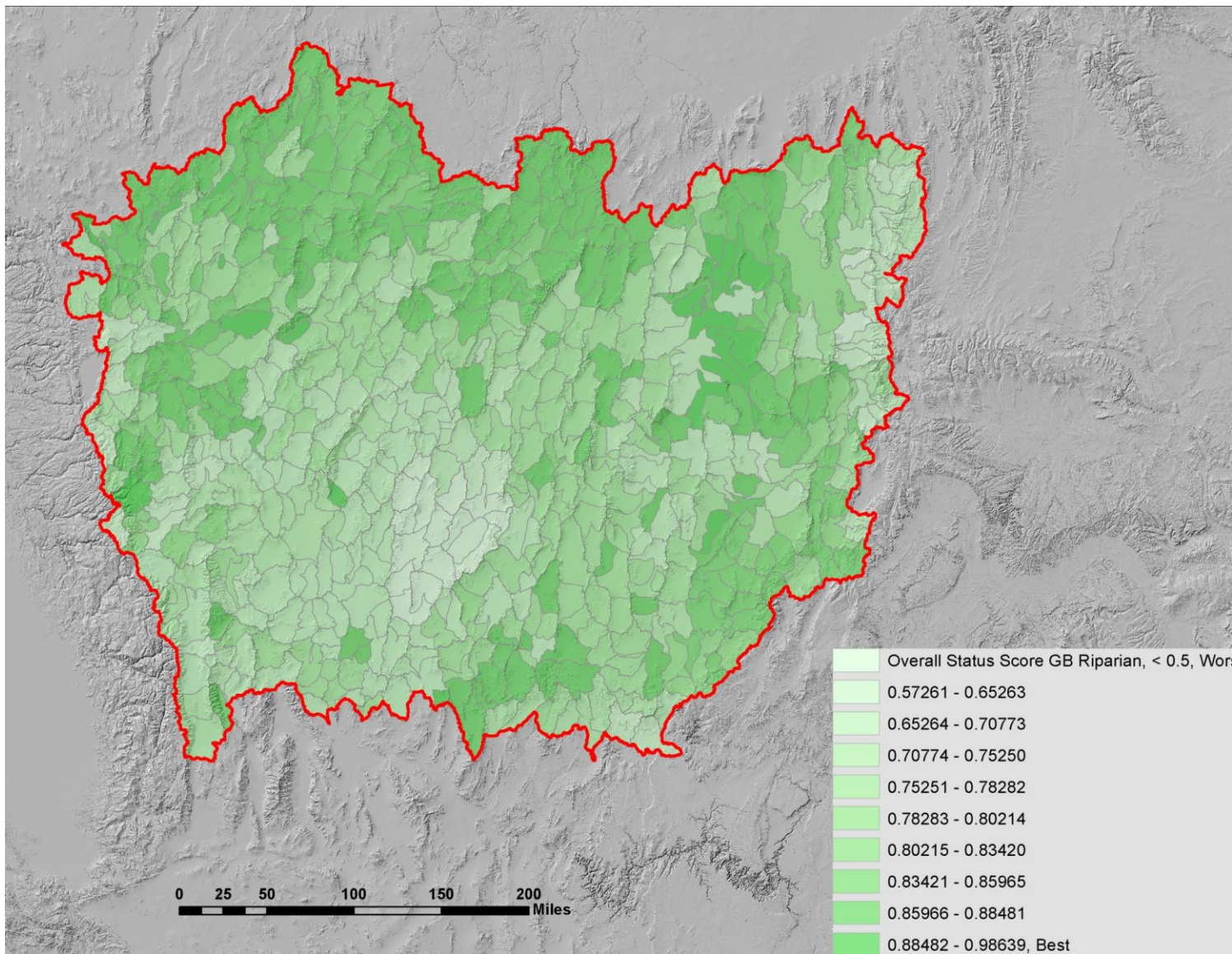
Aquatic Invasive Index



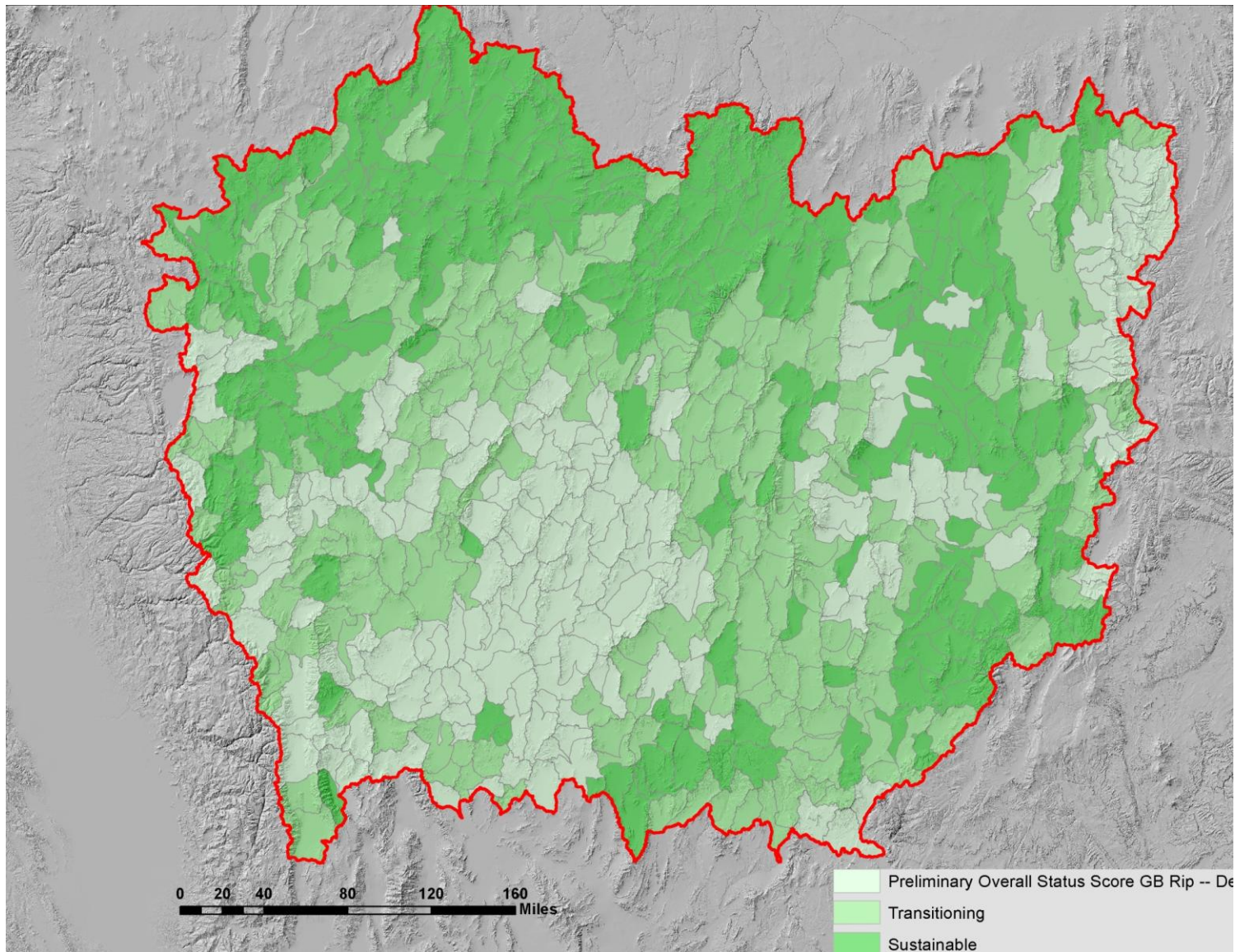
Aquatic Invasives as Change Agent

- Future Impact metric categories
 - Number of novel invasive taxa upstream or downstream of HUC
 - Proximity to nearby infected HUCs
 - Immediately adjacent HUCs = short-term risk
 - HUCs within ecoregion = long-term risk
 - Human use in nearby HUCs
 - Immediately adjacent HUCs = short-term risk
 - HUCs within ecoregion = long-term risk

Riparian-Stream System Rollup



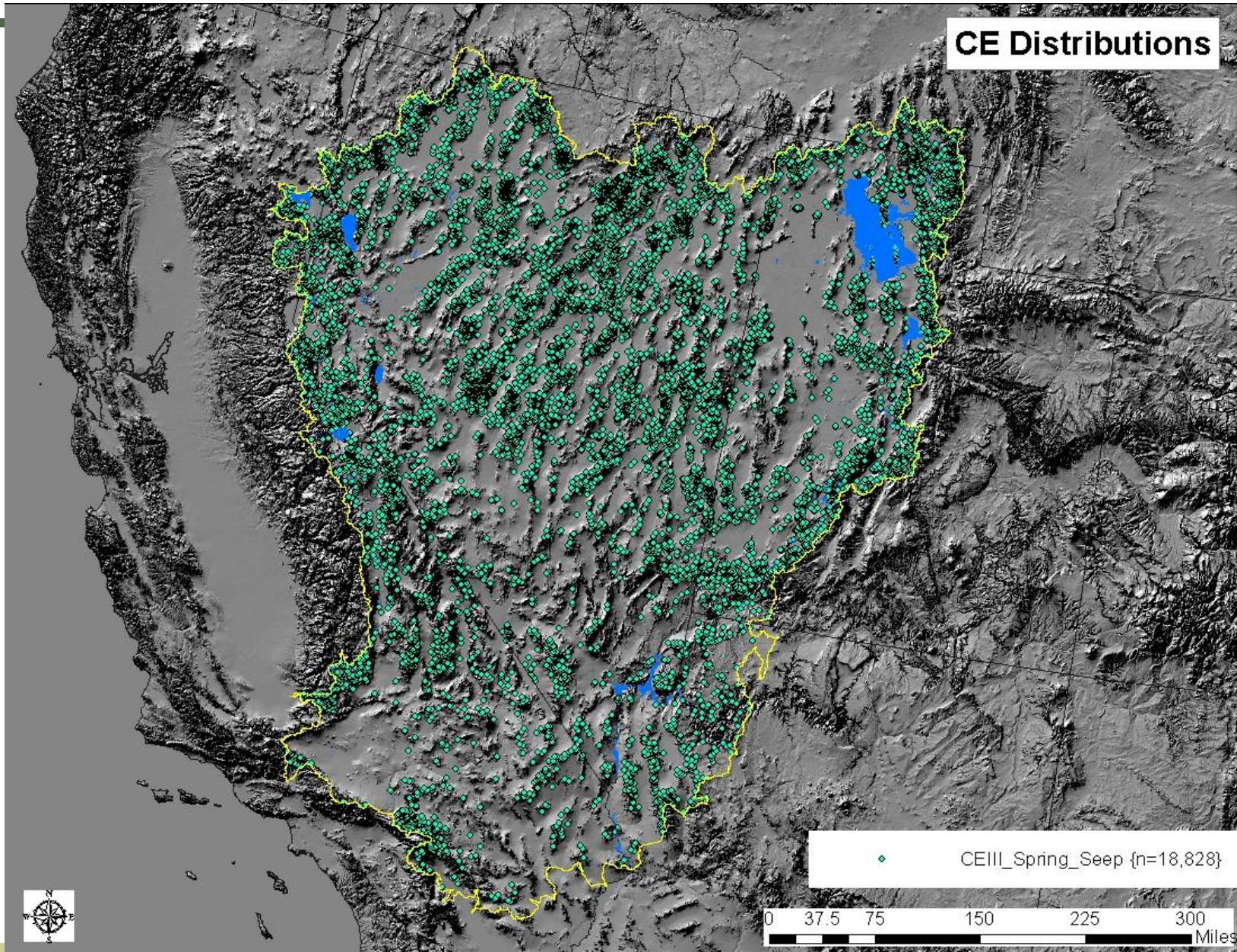
Riparian-Stream System Rollup



Mojave Desert Springs & Seeps



Springs and Seeps

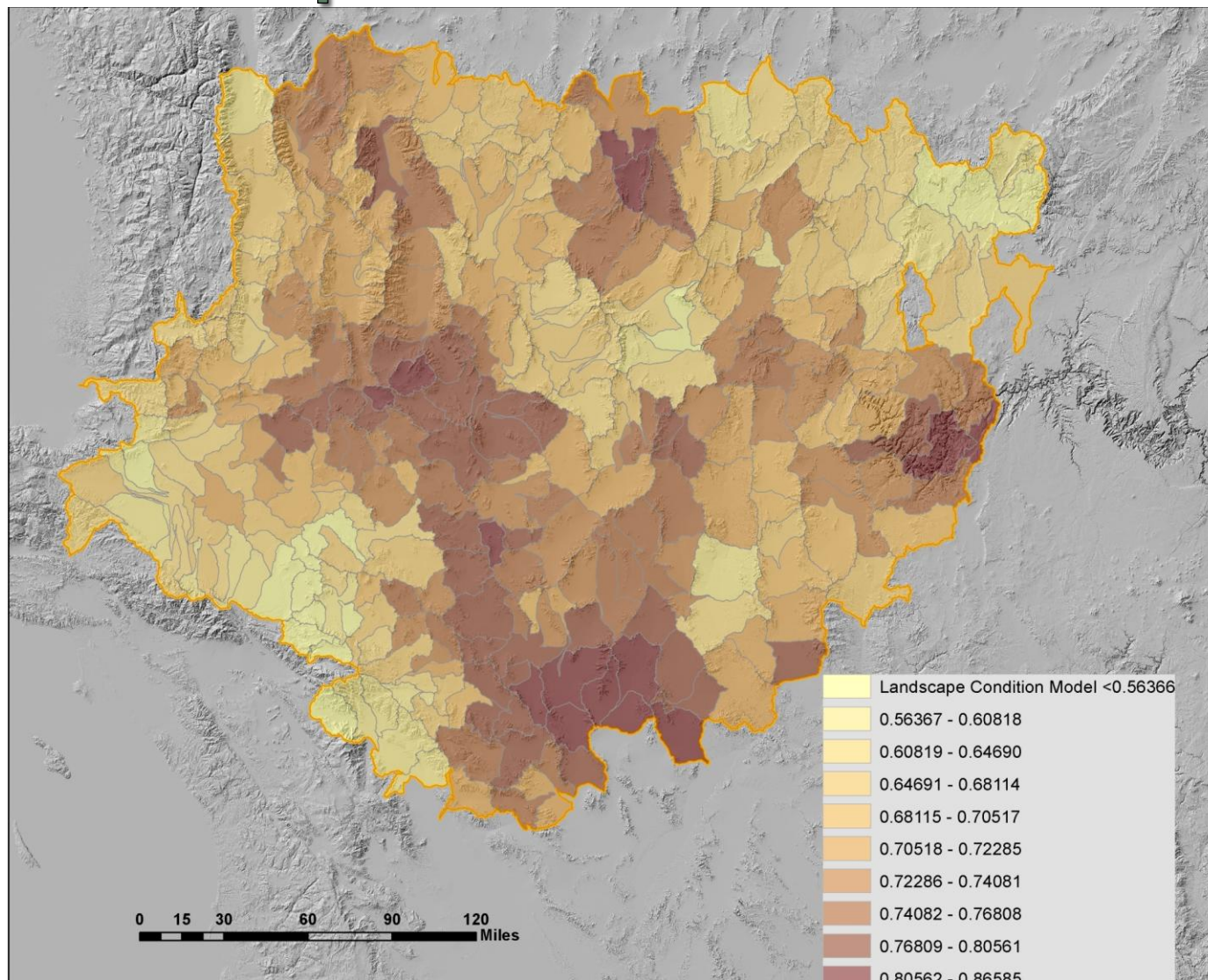


Preliminary Results

- KEA: Surrounding Land Use Context
 - *Landscape Condition Model*
 - *Atmospheric Deposition*
 - *Point Source Pollution*
- KEA: Water Quality Condition
 - *Sediment Loading Index*
- KEA: Aquatic Biota Condition
 - *Aquatic Invasives Index*

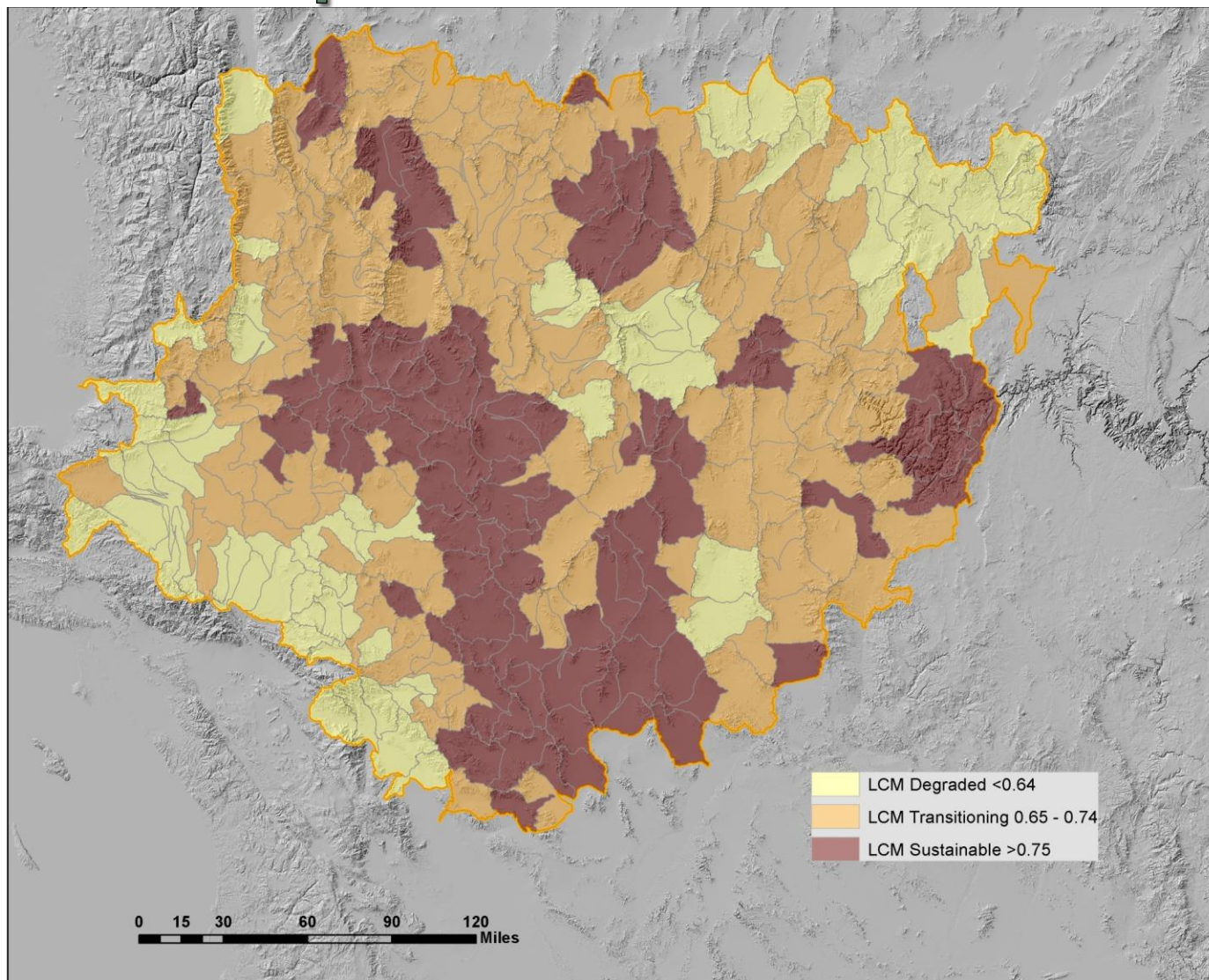
Surrounding Land Use Context

Landscape Condition Model Index



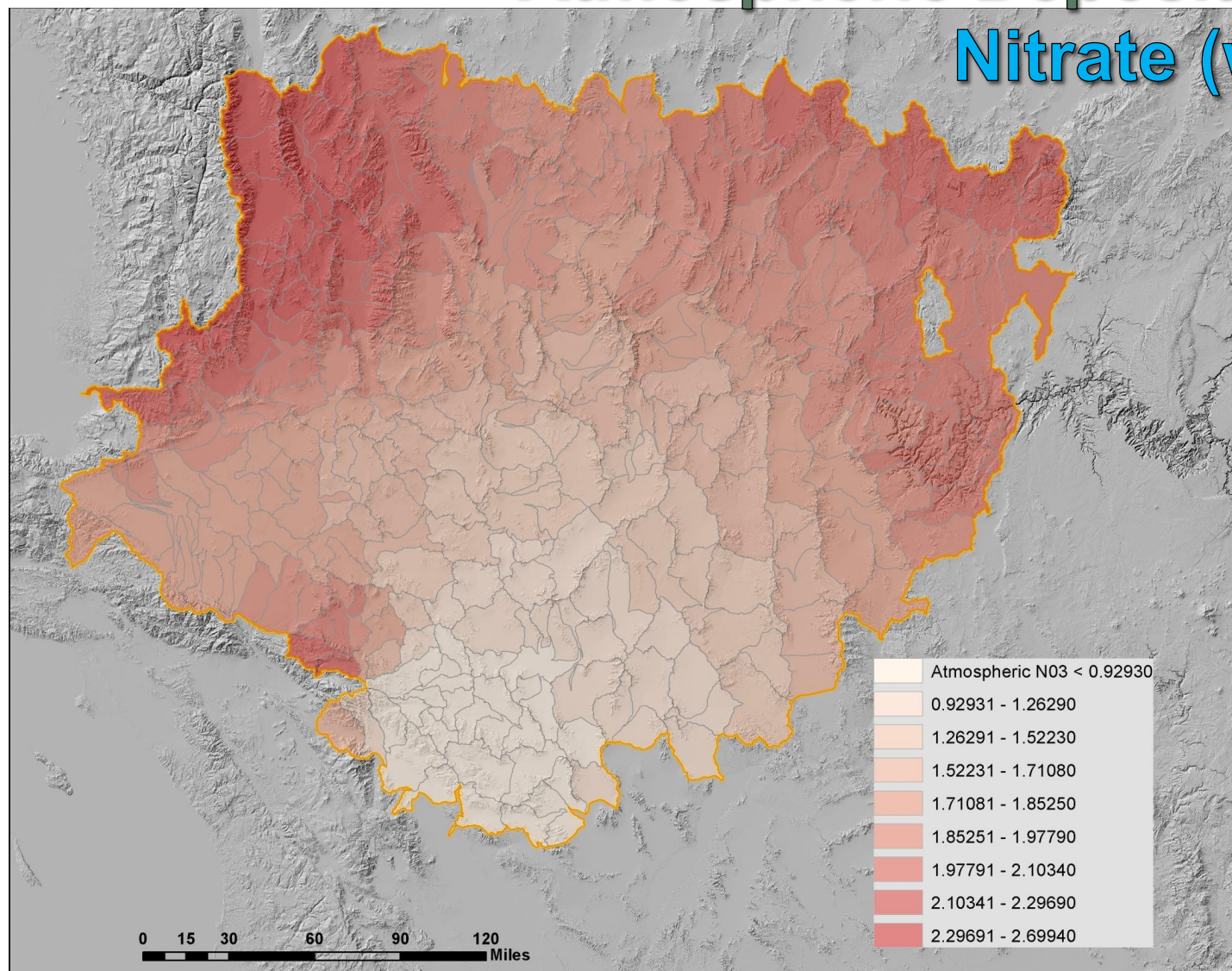
Surrounding Land Use Context

Landscape Condition Model Index



Surrounding Land Use Context

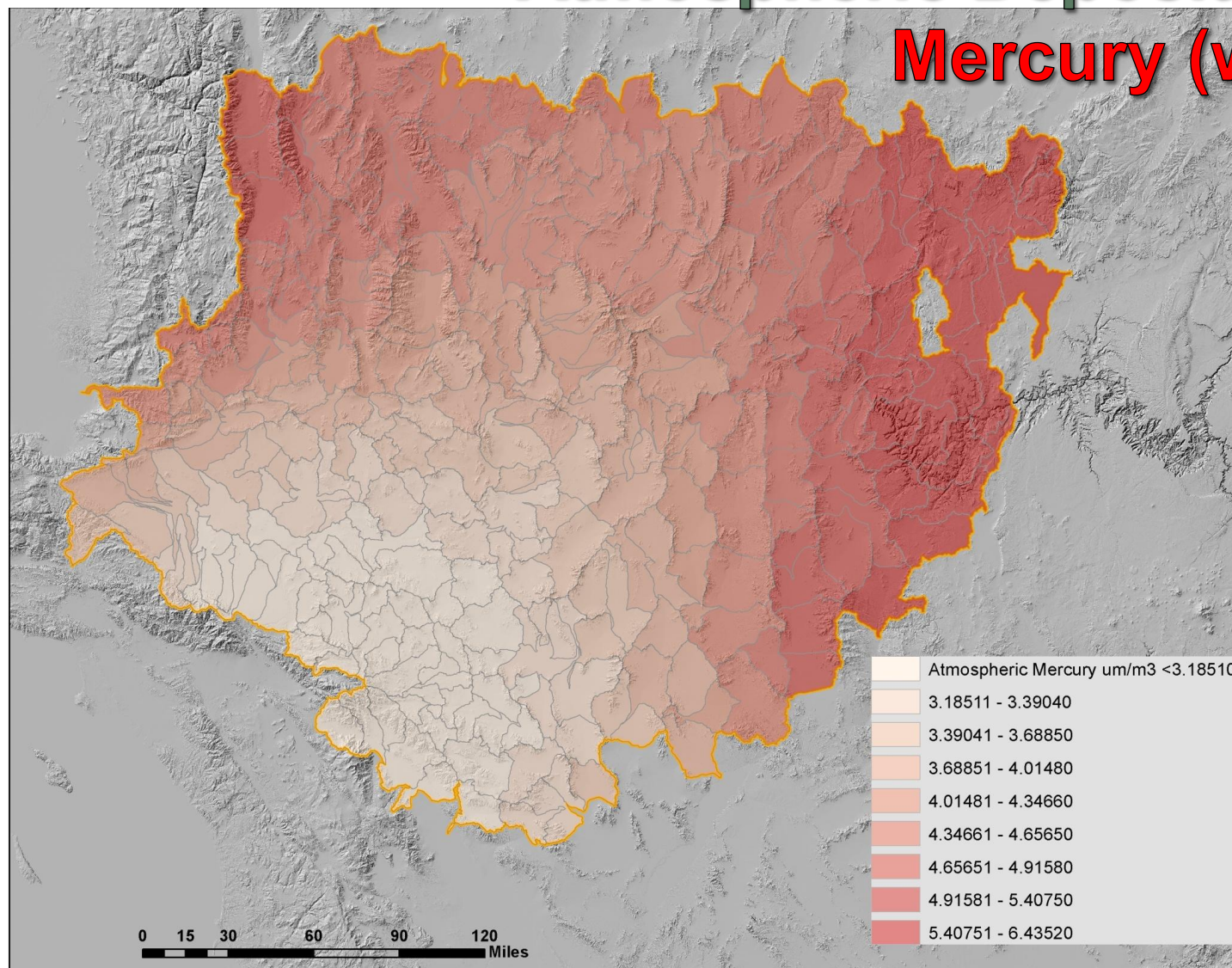
Atmospheric Deposition: Nitrate (wet)



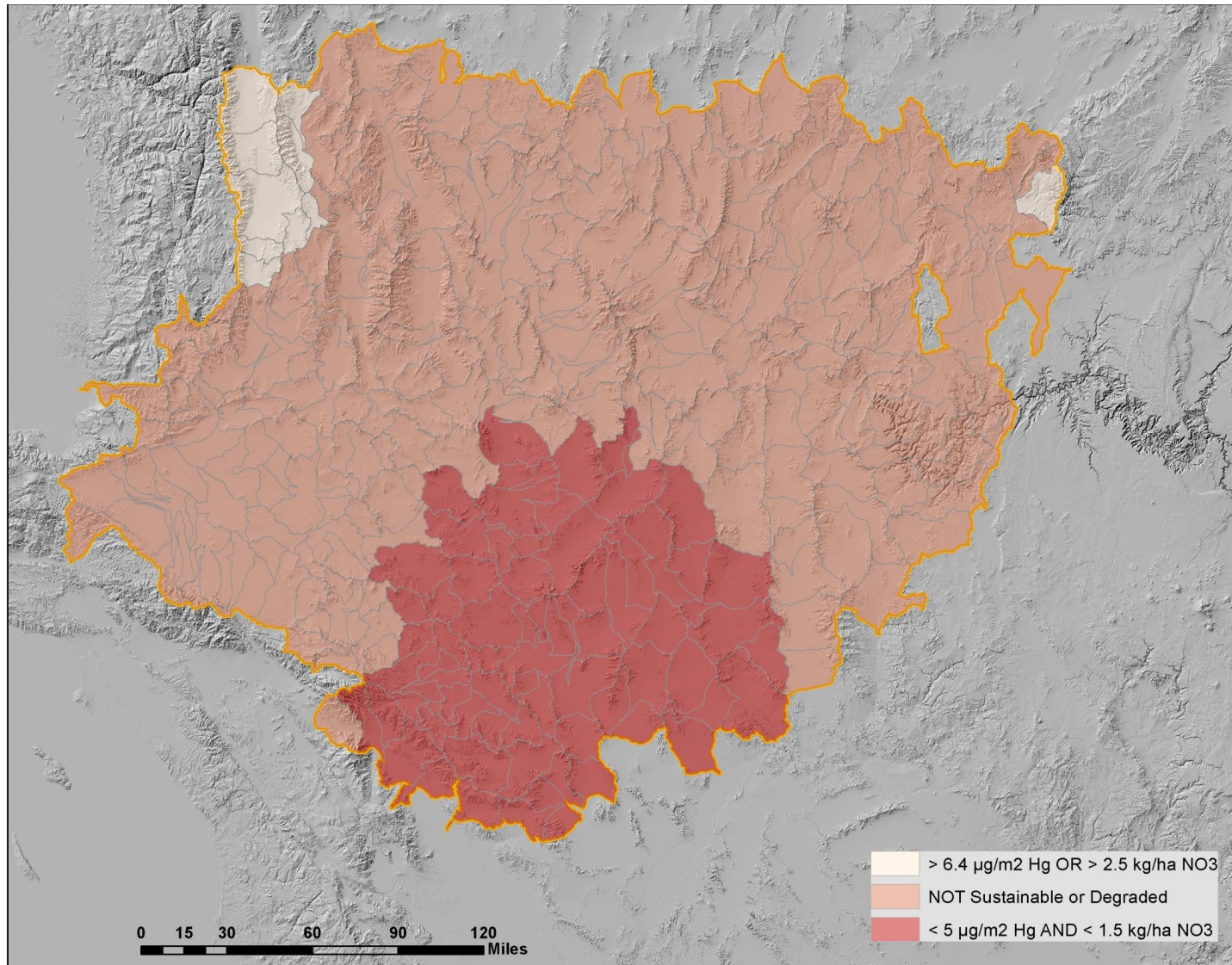
Surrounding Land Use Context

Atmospheric Deposition:

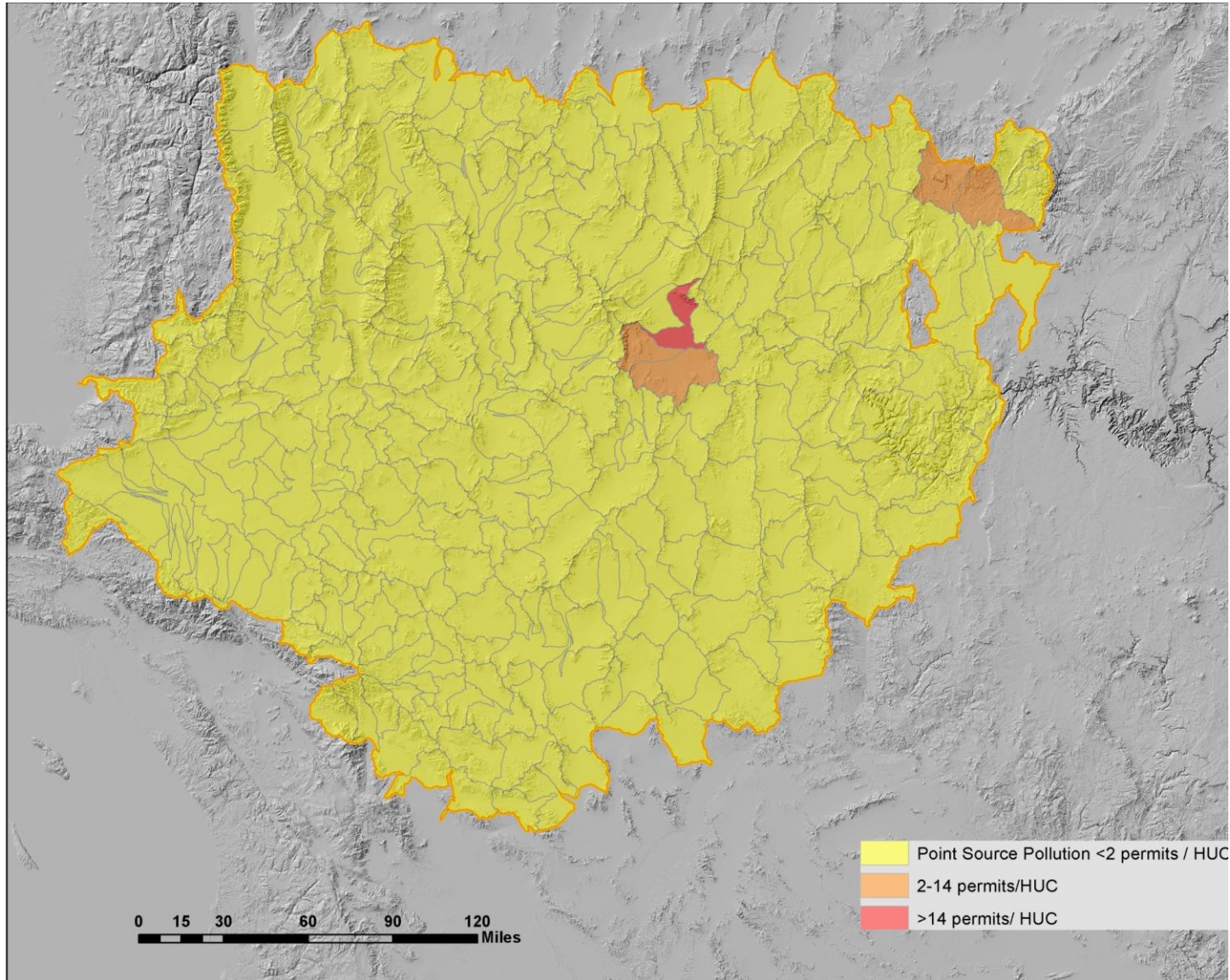
Mercury (wet)



Atmospheric Deposition: Combined

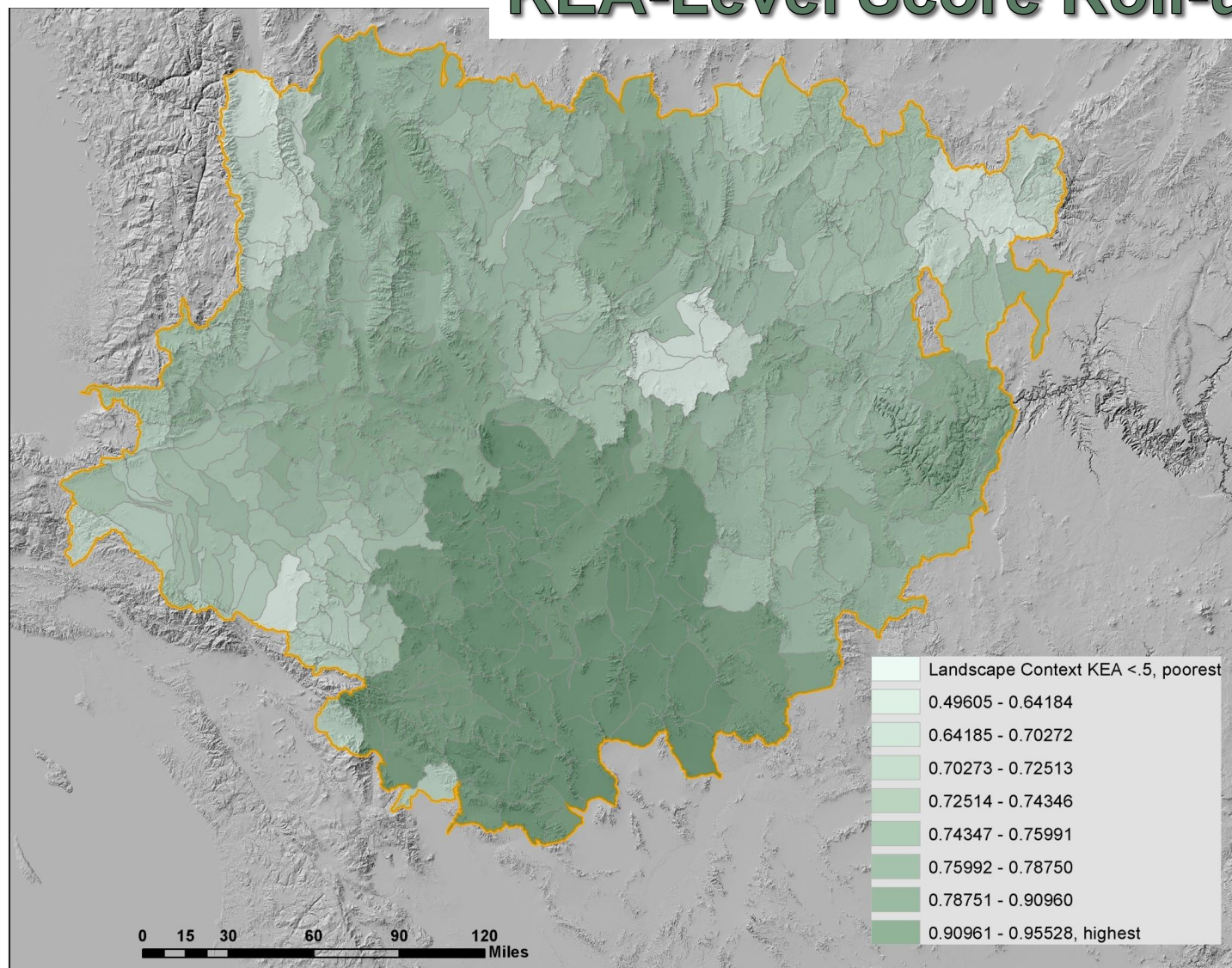


Point-Source Pollution



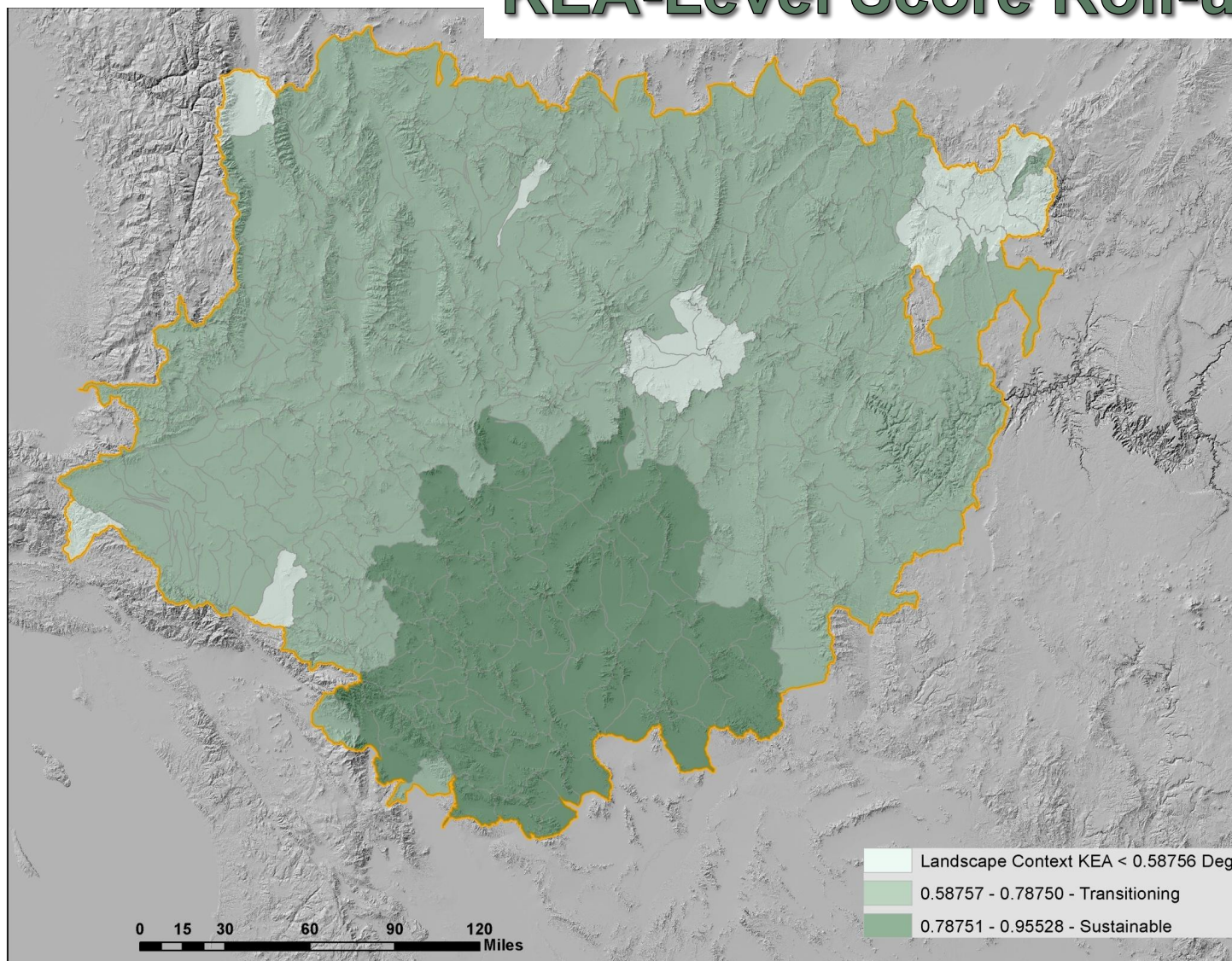
Surrounding Land Use Context

KEA-Level Score Roll-up



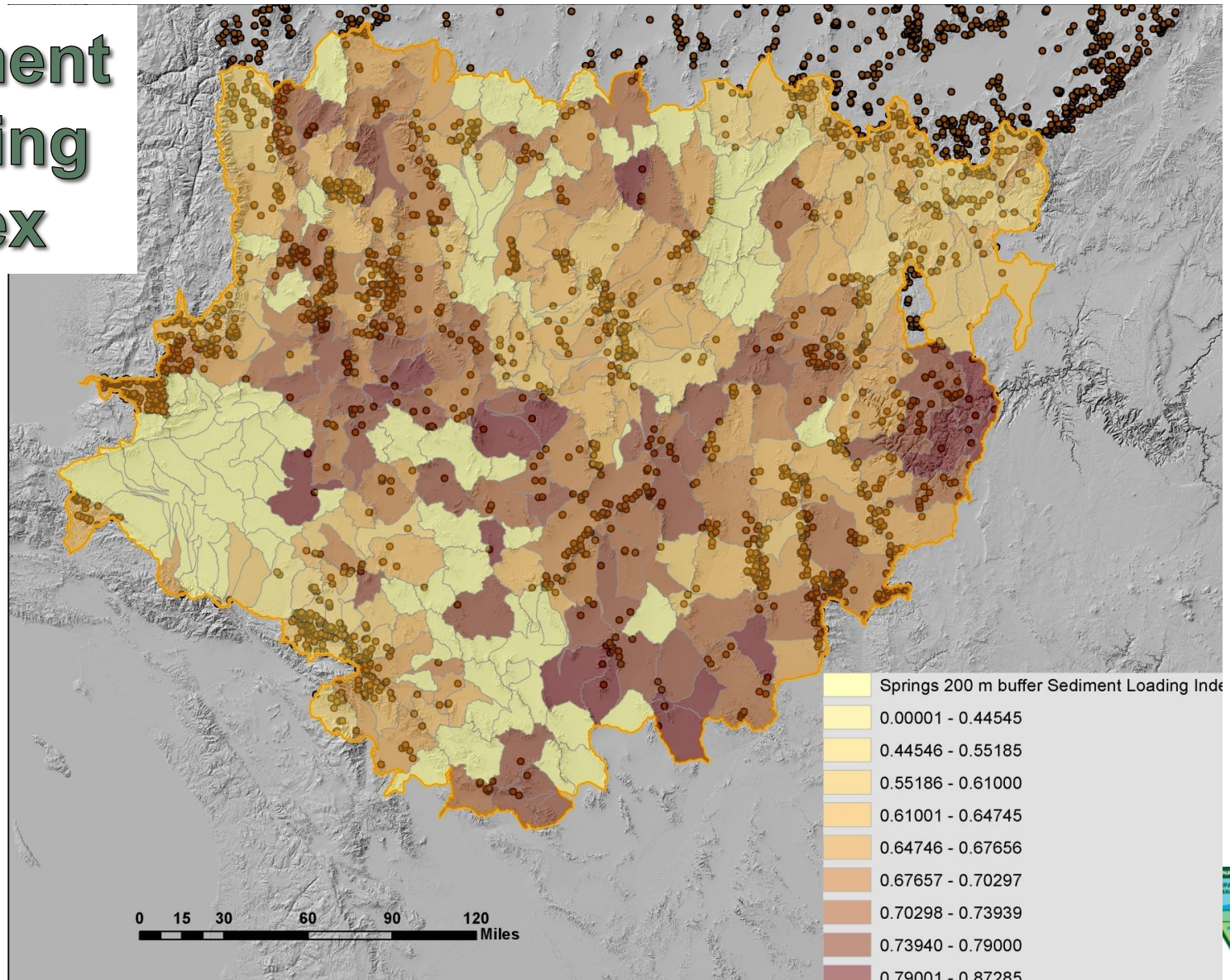
Surrounding Land Use Context

KEA-Level Score Roll-up

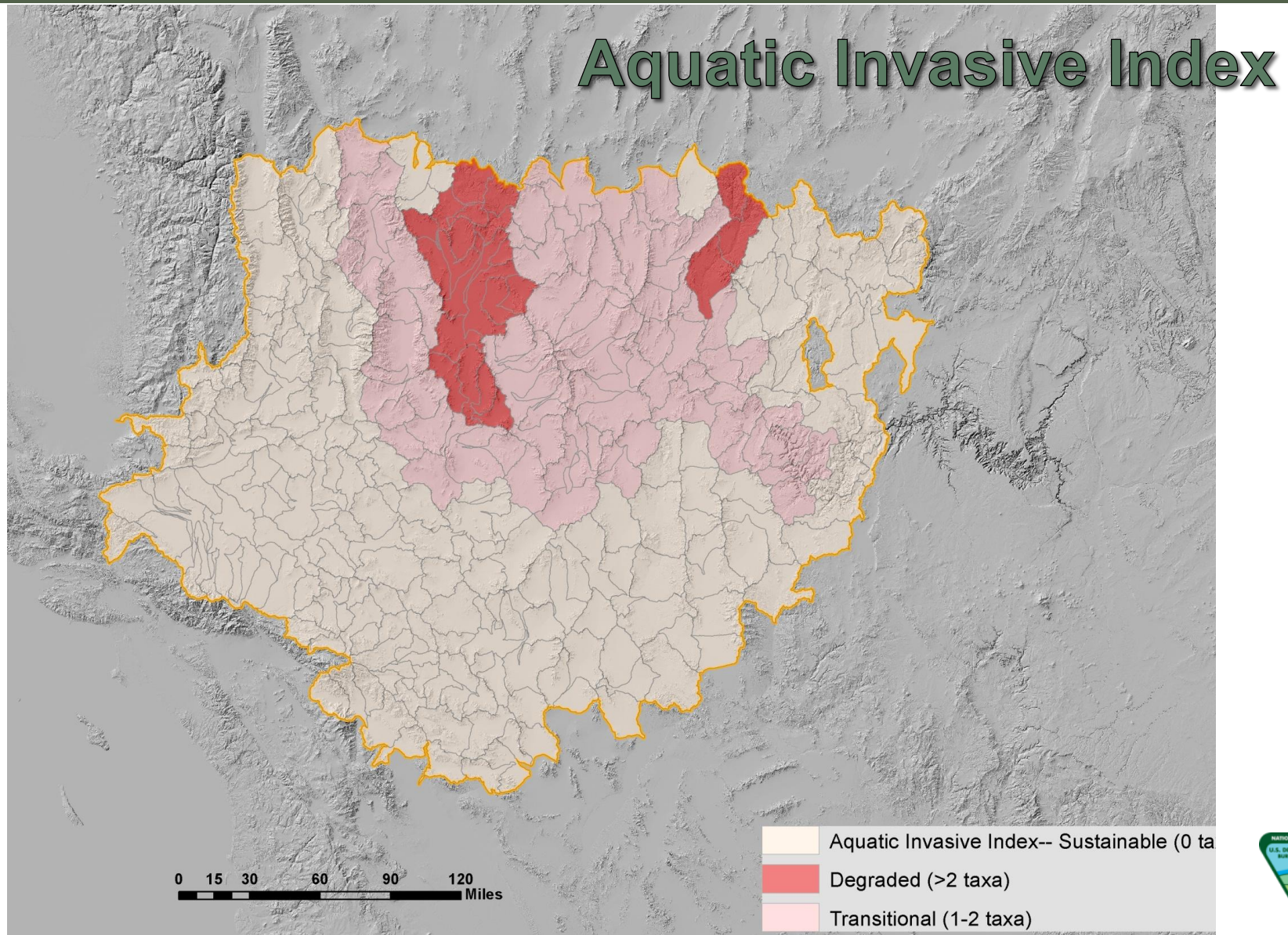


Water Quality Condition

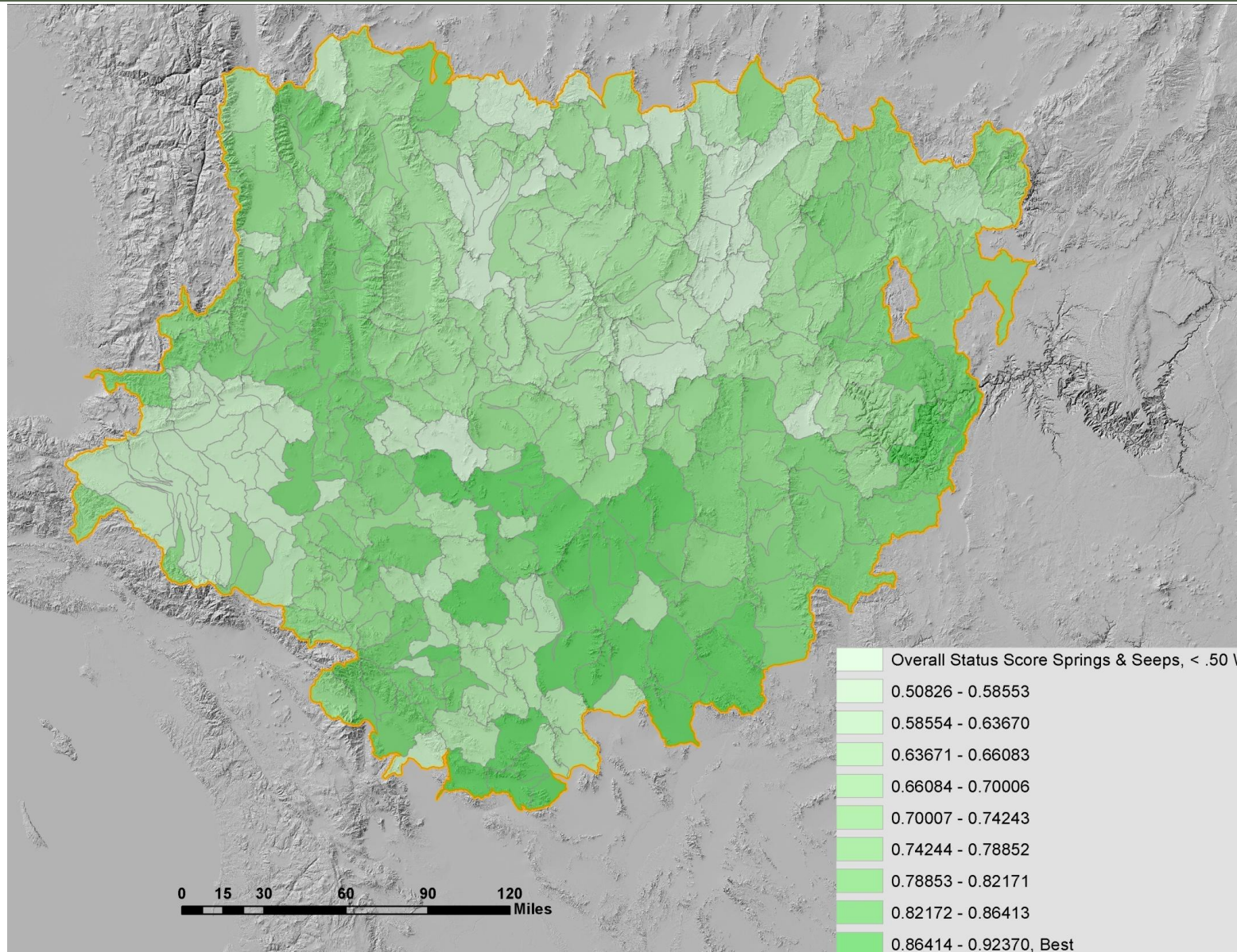
Sediment Loading Index



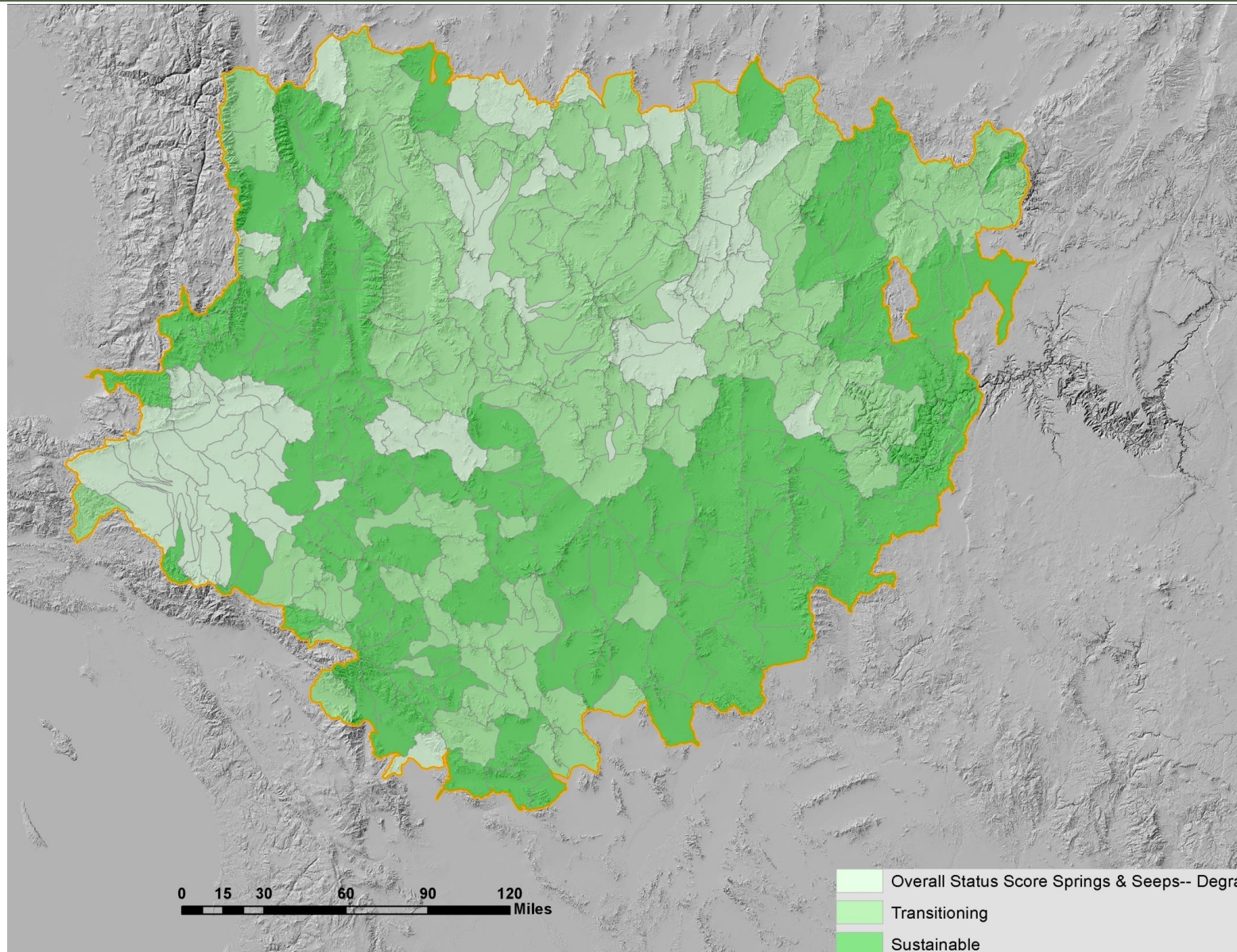
Aquatic Biota Condition



Mojave Desert Spring-Seep Rollup



Mojave Desert Spring-Seep Rollup



Roll-Up Process

- Indicators to KEA ecological status
 - Weighting all indicators equally
- KEAs to CE ecological status
 - Weighting all KEAs equally
- Status of aquatic CEs by HUC, to HUC aquatic ecological integrity
 - Assess high and low elevation; surface- and groundwater dependent aquatic CEs together?
 - Assess aquatics separately or together with all other CEs by HUC?

Recommended Changes to Aquatic CE Indicators from AMT-5

- Stream Benthic Macroinvertebrate Bioassessment data
 - *Use to check predictions of stream CE status based on the other indicators*
- Aquatic Invasives Current Status
 - *Evidence of infestation as separate indicator (varying severity); score as “no data” elsewhere*
 - *Current vulnerability as separate indicator*
- Point-Source Pollution Permits
 - *Do not use as indicator for Springs/Seeps CEs*
- Atmospheric Deposition
 - *Less impact to springs per se (vs. downstream wetlands); weight less than other indicators*

Adjourn Day 1
Dinner on your own

